

## SEQUENCE LISTING

&lt;110&gt; ffrench-Constant, Richard

Waterfield, Nicholas

&lt;120&gt; DNA Sequences from tcd Genomic Region of Photorhabdus luminescens

&lt;130&gt; 62878

&lt;160&gt; 16

&lt;170&gt; PatentIn version 3.0

&lt;210&gt; 1

&lt;211&gt; 7551

&lt;212&gt; DNA

&lt;213&gt; Photorhabdus luminescens

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1)..(7548)

&lt;400&gt; 1

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1				5					10					15		

ggt	ttt	aat	tgt	ctg	aca	gat	att	agc	cac	agc	tct	ttt	aat	gaa	ttt	96
Gly	Phe	Asn	Cys	Leu	Thr	Asp	Ile	Ser	His	Ser	Ser	Phe	Asn	Glu	Phe	
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cgc	cag	caa	gta	tct	gag	cac	ctc	tcc	tgg	tcc	gaa	aca	cac	gac	tta	144
Arg	Gln	Gln	Val	Ser	Glu	His	Leu	Ser	Trp	Ser	Glu	Thr	His	Asp	Leu	
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tat	cat	gat	gca	caa	cag	gca	caa	aag	gat	aat	cgc	ctg	tat	gaa	gcg	192
Tyr	His	Asp	Ala	Gln	Gln	Ala	Gln	Lys	Asp	Asn	Arg	Leu	Tyr	Glu	Ala	
	50					55					60					

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65					70					75					80	

gcc	att	ctc	gct	ccc	aat	gct	gaa	ctg	ata	ggc	tat	aac	aat	caa	ttt	288
Ala	Ile	Leu	Ala	Pro	Asn	Ala	Glu	Leu	Ile	Gly	Tyr	Asn	Asn	Gln	Phe	
				85					90					95		

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Ser	Gly	Arg	Ala	Ser	Gln	Tyr	Val	Ala	Pro	Gly	Thr	Val	Ser	Ser	Met	
			100					105						110		

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Phe	Ser	Pro	Ala	Ala	Tyr	Leu	Thr	Glu	Leu	Tyr	Arg	Glu	Ala	Arg	Asn	
		115					120					125				

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Leu	His	Ala	Ser	Asp	Ser	Val	Tyr	Tyr	Leu	Asp	Thr	Arg	Arg	Pro	Asp		
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Leu	Lys	Ser	Met	Ala	Leu	Ser	Gln	Gln	Asn	Met	Asp	Ile	Glu	Leu	Ser		
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Thr	Leu	Ser	Leu	Ser	Asn	Glu	Leu	Leu	Leu	Glu	Ser	Ile	Lys	Thr	Glu		
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Ser	Lys	Leu	Glu	Asn	Tyr	Thr	Lys	Val	Met	Glu	Met	Leu	Ser	Thr	Phe		
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Pro	Ala	Ile	Ala	Gly	Leu	Met	His	Gln	Ala	Ser	Leu	Leu	Gly	Ile	Asn		
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Pro	Ala	Ser	Leu	Ala	Met	Pro	Glu	Tyr	Leu	Lys	Arg	Tyr	Tyr	Asn	Leu		
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Tyr	Arg	Leu	Asp	Tyr	Lys	Phe	Lys	Asn	Phe	Tyr	Asn	Ala	Ser	Tyr	Leu		
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Pro 385	Gln	Val	Asn	Ile	Glu 390	Tyr	Ser	Ala	Asn	Ile 395	Thr	Leu	Asn	Thr	Ala 400	
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ggc Gly	tct Ser	tgg Trp	gca Ala	tat Tyr	gcc Ala	gcc Ala	gca Ala	aaa Lys	ttt Phe	acc Thr	ggt Val	gaa Glu	gag Glu	tat Tyr	aac Asn	1296
caa Gln	tac Tyr	tct Ser	ttt Phe	ctg Leu	cta Leu	aaa Lys	ctt Leu	aac Asn	aag Lys	gct Ala	att Ile	cgt Arg	cta Leu	tca Ser	cgt Arg	1344
gcg Ala	aca Thr	gaa Glu	ttg Leu	tca Ser	ccc Pro	acg Thr	att Ile	ctg Leu	gaa Glu	ggc Gly	att Ile	gtg Val	cgc Arg	agt Ser	gtt Val	1392
aat Asn	cta Leu	caa Gln	ctg Leu	gat Asp	atc Ile	aac Asn	aca Thr	gac Asp	gta Val	tta Leu	ggc Gly	aaa Lys	gtt Val	ttt Phe	ctg Leu	1440
act Thr	aaa Lys	tat Tyr	tat Tyr	atg Met	cag Gln	cgt Arg	tat Tyr	gct Ala	att Ile	cat His	gct Ala	gaa Glu	act Thr	gcc Ala	ctg Leu	1488
ata Ile	cta Leu	tgc Cys	aac Asn	gcg Ala	cct Pro	att Ile	tca Ser	caa Gln	cgt Arg	tca Ser	tat Tyr	gat Asp	aat Asn	caa Gln	cct Pro	1536
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gat Asp	tgg Trp	cga Arg	aaa Lys	acc Thr	ata Ile	ctt Leu	aag Lys	cgt Arg	gca Ala	ttt Phe	aat Asn	att Ile	gat Asp	gat Asp	gtc Val	1680
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tta Leu	ctg Leu	gca Ala	gat Asp	att Ile	cat His	caa Gln	tta Leu	acc Thr	att Ile	gat Asp	gaa Glu	ctg Leu	gat Asp	tta Leu	tta Leu	1824
ctg Leu	att Ile	gcc Ala	gta Val	ggc Gly	gaa Glu	gga Gly	aaa Lys	act Thr	aat Asn	tta Leu	tcc Ser	gct Ala	atc Ile	agt Ser	gat Asp	1872
aag Lys	caa Gln	ttg Leu	gct Ala	acc Thr	ctg Leu	atc Ile	aga Arg	aaa Lys	ctc Leu	aat Asn	act Thr	att Ile	acc Thr	agc Ser	tgg Trp	1920
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Thr	Ser	Tyr	Asn	Lys	Thr	Leu	Thr	Pro	Glu	Ile	Lys	Asn	Leu	Leu	Asp		
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acc	gtc	tac	cac	ggg	tta	caa	ggg	ttt	gat	aaa	gac	aaa	gca	gat	ttg	2064	
Thr	Val	Tyr	His	Gly	Leu	Gln	Gly	Phe	Asp	Lys	Asp	Lys	Ala	Asp	Leu		
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Leu	His	Val	Met	Ala	Pro	Tyr	Ile	Ala	Ala	Thr	Leu	Gln	Leu	Ser	Ser		
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gaa	aat	gtc	gcc	cac	tcg	gta	ctc	ctt	tgg	gca	gat	aag	tta	cag	ccc	2160	
Glu	Asn	Val	Ala	His		Val	Leu	Leu	Trp	Ala	Asp	Lys	Leu	Gln	Pro		
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ggc	gac	ggc	gca	atg	aca	gca	gaa	aaa	ttc	tgg	gac	tgg	ttg	aat	act	2208	
Gly	Asp	Gly	Ala	Met	Thr	Ala	Glu	Lys	Phe	Trp	Asp	Trp	Leu	Asn	Thr		
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Lys	Tyr	Thr	Pro	Gly	Ser	Ser	Glu	Ala	Val	Glu	Thr	Gln	Glu	His	Ile		
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Val	Gln	Tyr	Cys	Gln	Ala	Leu	Ala	Gln	Leu	Glu	Met	Val	Tyr	His	Ser		
		755					760					765					
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Met	Phe	Gly	Ala	Ala	Thr	Gly	Ala	Ala	Pro	Ala	His	Asp	Ala	Leu	Ser		
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ctg	att	atg	ctg	aca	cgt	ttt	gcg	gat	tgg	gtg	aac	gca	cta	ggc	gaa	2448	
Leu	Ile	Met	Leu	Thr	Arg	Phe	Ala	Asp	Trp	Val	Asn	Ala	Leu	Gly	Glu		
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aaa	gcg	tcc	tcg	gtg	cta	gcg	gca	ttt	gaa	gct	aac	tcg	tta	acg	gca	2496	
Lys	Ala	Ser	Ser	Val	Leu	Ala	Ala	Phe	Glu	Ala	Asn	Ser	Leu	Thr	Ala		
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gaa	caa	ctg	gct	gat	gcc	atg	aat	ctt	gat	gct	aat	ttg	ctg	ttg	caa	2544	
Glu	Gln	Leu	Ala	Asp	Ala	Met	Asn	Leu	Asp	Ala	Asn	Leu	Leu	Leu	Gln		
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gcc	agt	att	caa	gca	caa	aat	cat	caa	cat	ctt	ccc	cca	gta	act	cca	2592	
Ala	Ser	Ile	Gln	Ala	Gln	Asn	His	Gln	His	Leu	Pro	Pro	Val	Thr	Pro		
	850					855					860						
gaa	aat	gcg	ttc	tcc	tgt	tgg	aca	tct	atc	aat	act	atc	ctg	caa	tgg	2640	
Glu	Asn	Ala	Phe	Ser	Cys	Trp	Thr	Ser	Ile	Asn	Thr	Ile	Leu	Gln	Trp		
	865				870				875					880			
gtt	aat	gtc	gca	caa	caa	ttg	aat	gtc	gcc	cca	cag	ggc	gtt	tcc	gct	2688	
Val	Asn	Val	Ala	Gln	Gln	Leu	Asn	Val	Ala	Pro	Gln	Gly	Val	Ser	Ala		
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ttg	gtc	ggg	ctg	gat	tat	att	caa	tca	atg	aaa	gag	aca	ccg	acc	tat	2736	

Leu Val Gly	Leu Asp Tyr	Ile Gln Ser	Met Lys Glu	Thr Pro Thr	Tyr	
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gcc cag tgg gaa aac gcg gca ggc gta tta acc gcc ggg ttg aat tca	2784					
Ala Gln Trp	Glu Asn Ala	Ala Gly Val	Leu Thr Ala	Gly Leu Asn	Ser	
915		920		925		
caa cag gct aat aca tta cac gct ttt ctg gat gaa tct cgc agt gcc	2832					
Gln Gln Ala	Asn Thr Leu	His Ala Phe	Leu Asp Glu	Ser Arg Ser	Ala	
930		935		940		
gca tta agc acc tac tat atc cgt caa gtc gcc aag gca gcg gcg gct	2880					
Ala Leu Ser	Thr Tyr Tyr	Ile Arg Gln	Val Ala Lys	Ala Ala Ala	Ala	
945		950		955		960
att aaa agc cgt gat gac ttg tat caa tac tta ctg att gat aat cag	2928					
Ile Lys Ser	Arg Asp Leu	Tyr Gln Tyr	Leu Leu Ile	Asp Asn Gln		
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gtt tct gcg gca ata aaa acc acc cgg atc gcc gaa gcc att gcc agt	2976					
Val Ser Ala	Ala Ile Lys	Thr Thr Arg	Ile Ala Glu	Ala Ile Ala	Ser	
	980		985		990	
att caa ctg tac gtc aac cgg gca ttg gaa aat gtg gaa gaa aat gcc	3024					
Ile Gln Leu	Tyr Val Asn	Arg Ala Leu	Glu Asn Val	Glu Glu Asn	Ala	
	995		1000		1005	
aat tcg ggg gtt atc agc cgc caa ttc ttt atc gac tgg gac aaa	3069					
Asn Ser Gly	Val Ile Ser	Arg Gln Phe	Phe Ile Asp	Trp Asp Lys		
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tac aat aaa cgc tac agc act tgg gcg ggt gtt tct caa tta gtt	3114					
Tyr Asn Lys	Arg Tyr Ser	Thr Trp Ala	Gly Val Ser	Gln Leu Val		
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tac tac ccg gaa aac tat att gat ccg acc atg cgt atc gga caa	3159					
Tyr Tyr Pro	Glu Asn Tyr	Ile Asp Pro	Thr Met Arg	Ile Gly Gln		
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acc aaa atg atg gac gca tta ctg caa tcc gtc agc caa agc caa	3204					
Thr Lys Met	Met Asp Ala	Leu Leu Gln	Ser Val Ser	Gln Ser Gln		
	1055		1060		1065	
tta aac gcc gat acc gtc gaa gat gcc ttt atg tct tat ctg aca	3249					
Leu Asn Ala	Asp Thr Val	Glu Asp Ala	Phe Met Ser	Tyr Leu Thr		
	1070		1075		1080	
tcg ttt gaa caa gtg gct aat ctt aaa gtt att agc gca tat cac	3294					
Ser Phe Glu	Gln Val Ala	Asn Leu Lys	Val Ile Ser	Ala Tyr His		
	1085		1090		1095	
gat aat att aat aac gat caa ggg ctg acc tat ttt atc gga ctc	3339					
Asp Asn Ile	Asn Asn Asp	Gln Gly Leu	Thr Tyr Phe	Ile Gly Leu		
	1100		1105		1110	
agt gaa act gat gcc ggt gaa tat tat tgg cgc agt gtc gat cac	3384					
Ser Glu Thr	Asp Ala Gly	Glu Tyr Tyr	Trp Arg Ser	Val Asp His		
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Ser Lys Phe	Asn Asp Gly	Lys Phe Ala	Ala Asn Ala	Trp Ser Glu		
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Arg	Pro	Val	Ile	Tyr	Lys	Ser	Arg	Leu	Tyr	Leu	Leu	Trp	Leu	Glu	
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caa	aag	gag	atc	acc	aaa	cag	aca	gga	aat	agt	aaa	gat	ggc	tat	3564
Gln	Lys	Glu	Ile	Thr	Lys	Gln	Thr	Gly	Asn	Ser	Lys	Asp	Gly	Tyr	
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Gln	Thr	Glu	Thr	Asp	Tyr	Arg	Tyr	Glu	Leu	Lys	Leu	Ala	His	Ile	
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Arg	Tyr	Asp	Gly	Thr	Trp	Asn	Thr	Pro	Ile	Thr	Phe	Asp	Val	Asn	
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aaa	aaa	ata	tcc	gag	cta	aaa	ctg	gaa	aaa	aat	aga	gcg	ccc	gga	3699
Lys	Lys	Ile	Ser	Glu	Leu	Lys	Leu	Glu	Lys	Asn	Arg	Ala	Pro	Gly	
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ctc	tat	tgt	gcc	ggc	tat	caa	ggc	gaa	gat	acg	ttg	ctg	gtg	atg	3744
Leu	Tyr	Cys	Ala	Gly	Tyr	Gln	Gly	Glu	Asp	Thr	Leu	Leu	Val	Met	
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Phe	Tyr	Asn	Gln	Gln	Asp	Thr	Leu	Asp	Ser	Tyr	Lys	Asn	Ala	Ser	
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Met	Gln	Gly	Leu	Tyr	Ile	Phe	Ala	Asp	Met	Ala	Ser	Lys	Asp	Met	
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Thr	Pro	Glu	Gln	Ser	Asn	Val	Tyr	Arg	Asp	Asn	Ser	Tyr	Gln	Gln	
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Phe	Asp	Thr	Asn	Asn	Val	Arg	Arg	Val	Asn	Asn	Arg	Tyr	Ala	Glu	
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Asp	Tyr	Glu	Ile	Pro	Ser	Ser	Val	Ser	Ser	Arg	Lys	Asp	Tyr	Gly	
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Trp	Gly	Asp	Tyr	Tyr	Leu	Ser	Met	Val	Tyr	Asn	Gly	Asp	Ile	Pro	
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Thr	Ile	Asn	Tyr	Lys	Ala	Ala	Ser	Ser	Asp	Leu	Lys	Ile	Tyr	Ile	
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tca	cca	aaa	tta	aga	att	att	cat	aat	gga	tat	gaa	gga	cag	aag	4104
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Lys	Phe	Ile	Val	Tyr	Thr	Ser	Leu	Gly	Val	Asn	Pro	Asn	Asn	Ser	
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Asp	Glu	Asn	Ile	Asn	Ala	Gly	Glu	Asn	Gln	Ala	Met	Thr	Leu	Arg	
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&lt;210&gt; 2

&lt;211&gt; 2516

&lt;212&gt; PRT

&lt;213&gt; Photorhabdus luminescens

&lt;400&gt; 2

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Ala	Ile	Leu	Ala	Pro	Asn	Ala	Glu	Leu	Ile	Gly	Tyr	Asn	Asn	Gln	Phe
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Ser	Gly	Arg	Ala	Ser	Gln	Tyr	Val	Ala	Pro	Gly	Thr	Val	Ser	Ser	Met
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Phe	Ser	Pro	Ala	Ala	Tyr	Leu	Thr	Glu	Leu	Tyr	Arg	Glu	Ala	Arg	Asn
			115				120					125			
Leu	His	Ala	Ser	Asp	Ser	Val	Tyr	Tyr	Leu	Asp	Thr	Arg	Arg	Pro	Asp
	130					135					140				
Leu	Lys	Ser	Met	Ala	Leu	Ser	Gln	Gln	Asn	Met	Asp	Ile	Glu	Leu	Ser
145					150					155					160
Thr	Leu	Ser	Leu	Ser	Asn	Glu	Leu	Leu	Leu	Glu	Ser	Ile	Lys	Thr	Glu
				165					170					175	
Ser	Lys	Leu	Glu	Asn	Tyr	Thr	Lys	Val	Met	Glu	Met	Leu	Ser	Thr	Phe
			180					185					190		
Arg	Pro	Ser	Gly	Ala	Thr	Pro	Tyr	His	Asp	Ala	Tyr	Glu	Asn	Val	Arg
			195				200					205			
Glu	Val	Ile	Gln	Leu	Gln	Asp	Pro	Gly	Leu	Glu	Gln	Leu	Asn	Ala	Ser
	210					215					220				
Pro	Ala	Ile	Ala	Gly	Leu	Met	His	Gln	Ala	Ser	Leu	Leu	Gly	Ile	Asn
225					230					235					240
Ala	Ser	Ile	Ser	Pro	Glu	Leu	Phe	Asn	Ile	Leu	Thr	Glu	Glu	Ile	Thr
				245					250					255	
Glu	Gly	Asn	Ala	Glu	Glu	Leu	Tyr	Lys	Lys	Asn	Phe	Gly	Asn	Ile	Glu
			260					265					270		
Pro	Ala	Ser	Leu	Ala	Met	Pro	Glu	Tyr	Leu	Lys	Arg	Tyr	Tyr	Asn	Leu
			275				280					285			
Ser	Asp	Glu	Glu	Leu	Ser	Gln	Phe	Ile	Gly	Lys	Ala	Ser	Asn	Phe	Gly
	290					295					300				
Gln	Gln	Glu	Tyr	Ser	Asn	Asn	Gln	Leu	Ile	Thr	Pro	Val	Val	Asn	Ser
305					310					315					320
Ser	Asp	Gly	Thr	Val	Lys	Val	Tyr	Arg	Ile	Thr	Arg	Glu	Tyr	Thr	Thr
				325					330					335	
Asn	Ala	Tyr	Gln	Met	Asp	Val	Glu	Leu	Phe	Pro	Phe	Gly	Gly	Glu	Asn
			340					345					350		
Tyr	Arg	Leu	Asp	Tyr	Lys	Phe	Lys	Asn	Phe	Tyr	Asn	Ala	Ser	Tyr	Leu
			355				360					365			
Ser	Ile	Lys	Leu	Asn	Asp	Lys	Arg	Glu	Leu	Val	Arg	Thr	Glu	Gly	Ala
	370					375					380				

Pro	Gln	Val	Asn	Ile	Glu	Tyr	Ser	Ala	Asn	Ile	Thr	Leu	Asn	Thr	Ala	385	390	395	400
Asp	Ile	Ser	Gln	Pro	Phe	Glu	Ile	Gly	Leu	Thr	Arg	Val	Leu	Pro	Ser	405	410	415	
Gly	Ser	Trp	Ala	Tyr	Ala	Ala	Ala	Lys	Phe	Thr	Val	Glu	Glu	Tyr	Asn	420	425	430	
Gln	Tyr	Ser	Phe	Leu	Leu	Lys	Leu	Asn	Lys	Ala	Ile	Arg	Leu	Ser	Arg	435	440	445	
Ala	Thr	Glu	Leu	Ser	Pro	Thr	Ile	Leu	Glu	Gly	Ile	Val	Arg	Ser	Val	450	455	460	
Asn	Leu	Gln	Leu	Asp	Ile	Asn	Thr	Asp	Val	Leu	Gly	Lys	Val	Phe	Leu	465	470	475	480
Thr	Lys	Tyr	Tyr	Met	Gln	Arg	Tyr	Ala	Ile	His	Ala	Glu	Thr	Ala	Leu	485	490	495	
Ile	Leu	Cys	Asn	Ala	Pro	Ile	Ser	Gln	Arg	Ser	Tyr	Asp	Asn	Gln	Pro	500	505	510	
Ser	Gln	Phe	Asp	Arg	Leu	Phe	Asn	Thr	Pro	Leu	Leu	Asn	Gly	Gln	Tyr	515	520	525	
Phe	Ser	Thr	Gly	Asp	Glu	Glu	Ile	Asp	Leu	Asn	Ser	Gly	Ser	Thr	Gly	530	535	540	
Asp	Trp	Arg	Lys	Thr	Ile	Leu	Lys	Arg	Ala	Phe	Asn	Ile	Asp	Asp	Val	545	550	555	560
Ser	Leu	Phe	Arg	Leu	Leu	Lys	Ile	Thr	Asp	His	Asp	Asn	Lys	Asp	Gly	565	570	575	
Lys	Ile	Lys	Asn	Asn	Leu	Lys	Asn	Leu	Ser	Asn	Leu	Tyr	Ile	Gly	Lys	580	585	590	
Leu	Leu	Ala	Asp	Ile	His	Gln	Leu	Thr	Ile	Asp	Glu	Leu	Asp	Leu	Leu	595	600	605	
Leu	Ile	Ala	Val	Gly	Glu	Gly	Lys	Thr	Asn	Leu	Ser	Ala	Ile	Ser	Asp	610	615	620	
Lys	Gln	Leu	Ala	Thr	Leu	Ile	Arg	Lys	Leu	Asn	Thr	Ile	Thr	Ser	Trp	625	630	635	640
Leu	His	Thr	Gln	Lys	Trp	Ser	Val	Phe	Gln	Leu	Phe	Ile	Met	Thr	Ser	645	650	655	
Thr	Ser	Tyr	Asn	Lys	Thr	Leu	Thr	Pro	Glu	Ile	Lys	Asn	Leu	Leu	Asp	660	665	670	
Thr	Val	Tyr	His	Gly	Leu	Gln	Gly	Phe	Asp	Lys	Asp	Lys	Ala	Asp	Leu	675	680	685	
Leu	His	Val	Met	Ala	Pro	Tyr	Ile	Ala	Ala	Thr	Leu	Gln	Leu	Ser	Ser	690	695	700	
Glu	Asn	Val	Ala	His	Ser	Val	Leu	Leu	Trp	Ala	Asp	Lys	Leu	Gln	Pro	705	710	715	720

Gly Asp Gly Ala Met Thr Ala Glu Lys Phe Trp Asp Trp Leu Asn Thr  
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 Lys Tyr Thr Pro Gly Ser Ser Glu Ala Val Glu Thr Gln Glu His Ile  
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 Val Gln Tyr Cys Gln Ala Leu Ala Gln Leu Glu Met Val Tyr His Ser  
                               755                              760                              765  
 Thr Gly Ile Asn Glu Asn Ala Phe Arg Leu Phe Val Thr Lys Pro Glu  
                               770                              775                              780  
 Met Phe Gly Ala Ala Thr Gly Ala Ala Pro Ala His Asp Ala Leu Ser  
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 Leu Ile Met Leu Thr Arg Phe Ala Asp Trp Val Asn Ala Leu Gly Glu  
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 Lys Ala Ser Ser Val Leu Ala Ala Phe Glu Ala Asn Ser Leu Thr Ala  
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 Glu Gln Leu Ala Asp Ala Met Asn Leu Asp Ala Asn Leu Leu Leu Gln  
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 Ala Ser Ile Gln Ala Gln Asn His Gln His Leu Pro Pro Val Thr Pro  
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 Glu Asn Ala Phe Ser Cys Trp Thr Ser Ile Asn Thr Ile Leu Gln Trp  
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 Val Asn Val Ala Gln Gln Leu Asn Val Ala Pro Gln Gly Val Ser Ala  
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 Leu Val Gly Leu Asp Tyr Ile Gln Ser Met Lys Glu Thr Pro Thr Tyr  
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 Ala Gln Trp Glu Asn Ala Ala Gly Val Leu Thr Ala Gly Leu Asn Ser  
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 Gln Gln Ala Asn Thr Leu His Ala Phe Leu Asp Glu Ser Arg Ser Ala  
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 Ala Leu Ser Thr Tyr Tyr Ile Arg Gln Val Ala Lys Ala Ala Ala Ala  
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 Ile Lys Ser Arg Asp Asp Leu Tyr Gln Tyr Leu Leu Ile Asp Asn Gln  
                               965                              970                              975  
 Val Ser Ala Ala Ile Lys Thr Thr Arg Ile Ala Glu Ala Ile Ala Ser  
                               980                              985                              990  
 Ile Gln Leu Tyr Val Asn Arg Ala Leu Glu Asn Val Glu Glu Asn Ala  
                               995                              1000                              1005  
 Asn Ser Gly Val Ile Ser Arg Gln Phe Phe Ile Asp Trp Asp Lys  
                               1010                              1015                              1020  
 Tyr Asn Lys Arg Tyr Ser Thr Trp Ala Gly Val Ser Gln Leu Val  
                               1025                              1030                              1035  
 Tyr Tyr Pro Glu Asn Tyr Ile Asp Pro Thr Met Arg Ile Gly Gln  
                               1040                              1045                              1050  
 Thr Lys Met Met Asp Ala Leu Leu Gln Ser Val Ser Gln Ser Gln

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Leu	Asn	Ala	Asp	Thr	Val	Glu	Asp	Ala	Phe	Met	Ser	Tyr	Leu	Thr
1070						1075					1080			
Ser	Phe	Glu	Gln	Val	Ala	Asn	Leu	Lys	Val	Ile	Ser	Ala	Tyr	His
1085						1090					1095			
Asp	Asn	Ile	Asn	Asn	Asp	Gln	Gly	Leu	Thr	Tyr	Phe	Ile	Gly	Leu
1100						1105					1110			
Ser	Glu	Thr	Asp	Ala	Gly	Glu	Tyr	Tyr	Trp	Arg	Ser	Val	Asp	His
1115						1120					1125			
Ser	Lys	Phe	Asn	Asp	Gly	Lys	Phe	Ala	Ala	Asn	Ala	Trp	Ser	Glu
1130						1135					1140			
Trp	His	Lys	Ile	Asp	Cys	Pro	Ile	Asn	Pro	Tyr	Lys	Ser	Thr	Ile
1145						1150					1155			
Arg	Pro	Val	Ile	Tyr	Lys	Ser	Arg	Leu	Tyr	Leu	Leu	Trp	Leu	Glu
1160						1165					1170			
Gln	Lys	Glu	Ile	Thr	Lys	Gln	Thr	Gly	Asn	Ser	Lys	Asp	Gly	Tyr
1175						1180					1185			
Gln	Thr	Glu	Thr	Asp	Tyr	Arg	Tyr	Glu	Leu	Lys	Leu	Ala	His	Ile
1190						1195					1200			
Arg	Tyr	Asp	Gly	Thr	Trp	Asn	Thr	Pro	Ile	Thr	Phe	Asp	Val	Asn
1205						1210					1215			
Lys	Lys	Ile	Ser	Glu	Leu	Lys	Leu	Glu	Lys	Asn	Arg	Ala	Pro	Gly
1220						1225					1230			
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1235						1240					1245			
Phe	Tyr	Asn	Gln	Gln	Asp	Thr	Leu	Asp	Ser	Tyr	Lys	Asn	Ala	Ser
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Met	Gln	Gly	Leu	Tyr	Ile	Phe	Ala	Asp	Met	Ala	Ser	Lys	Asp	Met
1265						1270					1275			
Thr	Pro	Glu	Gln	Ser	Asn	Val	Tyr	Arg	Asp	Asn	Ser	Tyr	Gln	Gln
1280						1285					1290			
Phe	Asp	Thr	Asn	Asn	Val	Arg	Arg	Val	Asn	Asn	Arg	Tyr	Ala	Glu
1295						1300					1305			
Asp	Tyr	Glu	Ile	Pro	Ser	Ser	Val	Ser	Ser	Arg	Lys	Asp	Tyr	Gly
1310						1315					1320			
Trp	Gly	Asp	Tyr	Tyr	Leu	Ser	Met	Val	Tyr	Asn	Gly	Asp	Ile	Pro
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Thr	Ile	Asn	Tyr	Lys	Ala	Ala	Ser	Ser	Asp	Leu	Lys	Ile	Tyr	Ile
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Thr	Ser	Gly	Leu	Asn	Gln	Gly	Arg	Leu	Leu	Phe	His	Arg	Asp	Thr
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Thr	Tyr	Pro	Ser	Lys	Val	Glu	Ala	Trp	Ile	Pro	Gly	Ala	Lys	Arg
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Ser	Leu	Thr	Asn	Gln	Asn	Ala	Ala	Ile	Gly	Asp	Asp	Tyr	Ala	Thr
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Asp	Ser	Leu	Asn	Lys	Pro	Asp	Asp	Leu	Lys	Gln	Tyr	Ile	Phe	Met
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Thr	Asp	Ser	Lys	Gly	Thr	Ala	Thr	Asp	Val	Ser	Gly	Pro	Val	Glu
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Ile	Asn	Thr	Ala	Ile	Ser	Pro	Ala	Lys	Val	Gln	Ile	Ile	Val	Lys
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1535						1540					1545			
Ala	Ser	Ile	Asp	Val	Thr	Phe	Thr	Ala	Phe	Ala	Glu	Asp	Gly	Arg
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1565						1570					1575			
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Gln	Tyr	Met	Gln	Trp	Gln	Ser	Tyr	Arg	Thr	Arg	Leu	Asn	Thr	Leu
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Phe	Ala	Arg	Gln	Leu	Val	Ala	Arg	Ala	Thr	Thr	Gly	Ile	Asp	Thr
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1655						1660					1665			
Val	Asp	Asn	Asn	Ser	His	Ile	Ile	Tyr	Ser	Gly	Gln	Leu	Thr	Asp
1670						1675					1680			
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Asp	Lys	Gly	Ile	Val	Thr	Ile	Asn	Pro	Lys	Ser	Ile	Leu	Thr	His
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Phe	Glu	Ser	Val	Asn	Val	Leu	Asn	Asn	Ile	Ser	Ser	Glu	Pro	Met
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1760						1765					1770			
Tyr	Thr	Pro	Met	Leu	Val	Ala	Gln	Arg	Leu	Leu	His	Glu	Gln	Asn
1775						1780					1785			
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Gly	Tyr	Ile	Val	His	Gly	Gln	Ile	Gln	Asn	Tyr	Gln	Trp	Asn	Val
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Ala	Lys	Met	Trp	Tyr	Met	Gln	Ala	Leu	His	Leu	Leu	Gly	Asp	Lys
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Pro	Tyr	Leu	Pro	Leu	Ser	Thr	Thr	Trp	Ser	Asp	Pro	Arg	Leu	Asp
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Val	Ala	Leu	Arg	Gln	Asn	Ile	Pro	Thr	Pro	Ala	Pro	Leu	Ser	Leu
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Glu	Val	Met	Met	Asn	Tyr	Trp	Gln	Thr	Leu	Ala	Gln	Arg	Val	Tyr
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Pro	Ile	Tyr	Ala	Thr	Pro	Ala	Asp	Pro	Lys	Ala	Leu	Leu	Ser	Ala
1985						1990					1995			
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Met	Val 2030	Ser	Gln	Leu	Thr	Gln 2035	Phe	Gly	Ser	Thr	Leu 2040	Gln	Asn	Ile
Ile	Glu 2045	Arg	Gln	Asp	Ala	Glu 2050	Ala	Leu	Asn	Ala	Leu 2055	Leu	Gln	Asn
Gln	Ala 2060	Ala	Glu	Leu	Ile	Leu 2065	Thr	Asn	Leu	Ser	Ile 2070	Gln	Asp	Lys
Thr	Ile 2075	Glu	Glu	Leu	Asp	Ala 2080	Glu	Lys	Thr	Val	Leu 2085	Glu	Lys	Ser
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Asp	Glu 2105	Asn	Ile	Asn	Ala	Gly 2110	Glu	Asn	Gln	Ala	Met 2115	Thr	Leu	Arg
Ala	Ser 2120	Ala	Ala	Gly	Leu	Thr 2125	Thr	Ala	Val	Gln	Ala 2130	Ser	Arg	Leu
Ala	Gly 2135	Ala	Ala	Ala	Asp	Leu 2140	Val	Pro	Asn	Ile	Phe 2145	Gly	Phe	Ala
Gly	Gly 2150	Gly	Ser	Arg	Trp	Gly 2155	Ala	Ile	Ala	Glu	Ala 2160	Thr	Gly	Tyr
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Gln	Leu 2210	Lys	Ser	Leu	Ala	Val 2215	Arg	Arg	Glu	Ala	Ala 2220	Val	Leu	Gln
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Ala	Phe 2240	Leu	Gln	Arg	Lys	Phe 2245	Ser	Asn	Gln	Ala	Leu 2250	Tyr	Asn	Trp
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Gly	Thr 2300	Tyr	Ala	Gly	Leu	Leu 2305	Ala	Gly	Glu	Thr	Leu 2310	Met	Leu	Ser
Leu	Ala 2315	Gln	Met	Glu	Asp	Ala 2320	His	Leu	Lys	Arg	Asp 2325	Lys	Arg	Ala
Leu	Glu 2330	Val	Glu	Arg	Thr	Val 2335	Ser	Leu	Ala	Glu	Val 2340	Tyr	Ala	Gly

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 2345 2350 2355  
 Lys Leu Val Ser Gln Gly Ser Gly Ser Ala Gly Ser Gly Asn Asn  
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 Asn Leu Ala Phe Gly Ala Gly Thr Asp Thr Lys Thr Ser Leu Gln  
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Asn Asn Leu Thr Asp Ile Cys His Leu Ser Phe Asp Glu Leu Arg Lys	
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Lys Val Lys Asp Lys Leu Ser Trp Ser Gln Thr Gln Ser Leu Tyr Leu	
35 40 45	

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tca ttg gtg ctc agc cag aaa aat atg aat acg gag att tcc acg ctt Ser Leu Val Leu Ser Gln Lys Asn Met Asn Thr Glu Ile Ser Thr Leu 145 150 155 160	480
tct ctg tct aat aac atg ttg cta aac agt att aag act cag cct aat Ser Leu Ser Asn Asn Met Leu Leu Asn Ser Ile Lys Thr Gln Pro Asn 165 170 175	528
ctg aac agc cac gct aaa gtg atg gaa aag tta tca act ttc cgc act Leu Asn Ser His Ala Lys Val Met Glu Lys Leu Ser Thr Phe Arg Thr 180 185 190	576
tct ggc tca atg cca tat cac gat gct tat gaa agt gta cgt aag att Ser Gly Ser Met Pro Tyr His Asp Ala Tyr Glu Ser Val Arg Lys Ile 195 200 205	624
att caa tta caa gct cct gtg ttt gaa caa tcc agt aca tta aca gat Ile Gln Leu Gln Ala Pro Val Phe Glu Gln Ser Ser Thr Leu Thr Asp 210 215 220	672
acg cca atc acc aaa ctg atg tat caa atc tcc ttg ctg ggg att aat Thr Pro Ile Thr Lys Leu Met Tyr Gln Ile Ser Leu Leu Gly Ile Asn 225 230 235 240	720
gcc tct gtc tca ccg gag ctg ttt act att ctg acg caa aag ata aaa Ala Ser Val Ser Pro Glu Leu Phe Thr Ile Leu Thr Gln Lys Ile Lys 245 250 255	768
cca gca acc aat gct gat aac act aat gaa cta aaa aaa ctt tat aag Pro Ala Thr Asn Ala Asp Asn Thr Asn Glu Leu Lys Lys Leu Tyr Lys 260 265 270	816
aag aat ttt ggt gaa att aaa tct att caa atg gca agg gca gaa tac Lys Asn Phe Gly Glu Ile Lys Ser Ile Gln Met Ala Arg Ala Glu Tyr 275 280 285	864
ctg aaa agt tat tat aat ctg aca gac aaa gaa ctt aac cag ttt agt Leu Lys Ser Tyr Tyr Asn Leu Thr Asp Lys Glu Leu Asn Gln Phe Ser 290 295 300	912

aaa aag att aaa caa ata gat agc ctg tgg aat ata gga gac gag att Lys Lys Ile Lys Gln Ile Asp Ser Leu Trp Asn Ile Gly Asp Glu Ile 305 310 315 320	960
acc caa tac cat cta ttg aaa ttc aat aaa gct att aat cta tct cga Thr Gln Tyr His Leu Leu Lys Phe Asn Lys Ala Ile Asn Leu Ser Arg 325 330 335	1008
tca acc gag cta tca cca ata atc ctt aac agc att gcc atc gat atc Ser Thr Glu Leu Ser Pro Ile Ile Leu Asn Ser Ile Ala Ile Asp Ile 340 345 350	1056
ctt aaa aaa aca cct cca gag gat gac tct gac aac cct ttt agg gac Leu Lys Lys Thr Pro Pro Glu Asp Asp Ser Asp Asn Pro Phe Arg Asp 355 360 365	1104
gac cct gat tac ctt gaa agc ttt caa gac ctt gac ctt agt gac gaa Asp Pro Asp Tyr Leu Glu Ser Phe Gln Asp Leu Asp Leu Ser Asp Glu 370 375 380	1152
cca gat ata gac gaa gat gta tta aga gaa gct tta cgt gtt aaa gac Pro Asp Ile Asp Glu Asp Val Leu Arg Glu Ala Leu Arg Val Lys Asp 385 390 395 400	1200
tat atg caa cgt tat ggt att gat gct gag act gca tta ata ctg tgc Tyr Met Gln Arg Tyr Gly Ile Asp Ala Glu Thr Ala Leu Ile Leu Cys 405 410 415	1248
aaa gca ccc att tca gaa aat cct tct cat ccc gat cta tcc aaa tta Lys Ala Pro Ile Ser Glu Asn Pro Ser His Pro Asp Leu Ser Lys Leu 420 425 430	1296
cta gca gac atc cat caa tta act att gat gaa tta ggg gta cta ctg Leu Ala Asp Ile His Gln Leu Thr Ile Asp Glu Leu Gly Val Leu Leu 435 440 445	1344
gtt gcc ata gat gaa gga aaa acc gat tta tct cag att act cat gac Val Ala Ile Asp Glu Gly Lys Thr Asp Leu Ser Gln Ile Thr His Asp 450 455 460	1392
aat tta gcg gtt cta att agc aaa ctc tat tcc gtt acc aat tgg ctg Asn Leu Ala Val Leu Ile Ser Lys Leu Tyr Ser Val Thr Asn Trp Leu 465 470 475 480	1440
cgt aca cgg aaa tgg agt gta tat cag tta ttt gta atg acg acc gat Arg Thr Arg Lys Trp Ser Val Tyr Gln Leu Phe Val Met Thr Thr Asp 485 490 495	1488
aaa tat aac aaa acc tta acc ccg gaa ata aac aac ctt ctg gat acc Lys Tyr Asn Lys Thr Leu Thr Pro Glu Ile Asn Asn Leu Leu Asp Thr 500 505 510	1536
gtc tac aat ggc ttg cag aac ttt tac aag gat aat ttg cta aaa ata Val Tyr Asn Gly Leu Gln Asn Phe Tyr Lys Asp Asn Leu Leu Lys Ile 515 520 525	1584
aaa gat aat cta ttg aaa gcc aaa gaa agt tta cca gaa gac aaa gat Lys Asp Asn Leu Leu Lys Ala Lys Glu Ser Leu Pro Glu Asp Lys Asp 530 535 540	1632
aat ttg ccg aaa gcc gag caa tat ctg ttg gaa gcc gag aaa tat ctg Asn Leu Pro Lys Ala Glu Gln Tyr Leu Leu Glu Ala Glu Lys Tyr Leu 545 550 555 560	1680

cta gca gcc gag aaa tat ctg cta gca gcc gag aaa tat cta ttg gaa Leu Ala Ala Glu Lys Tyr Leu Leu Ala Ala Glu Lys Tyr Leu Leu Glu 565 570 575	1728
gcc aat aaa aat ccg cta gaa gcc aaa aag gct ctg aaa gaa tac gag Ala Asn Lys Asn Pro Leu Glu Ala Lys Lys Ala Leu Lys Glu Tyr Glu 580 585 590	1776
aaa aat cag gag gca tac gag aaa aat ctg aaa gaa cac gag aaa tat Lys Asn Gln Glu Ala Tyr Glu Lys Asn Leu Lys Glu His Glu Lys Tyr 595 600 605	1824
ctg ttg aaa gcc gga gaa aat ctg cca gca atc aaa gag aat ttg cta Leu Leu Lys Ala Gly Glu Asn Leu Pro Ala Ile Lys Glu Asn Leu Leu 610 615 620	1872
aaa atc aag gaa aat ctg cca aaa gcc ata tct cct tat atc gcc gcc Lys Ile Lys Glu Asn Leu Pro Lys Ala Ile Ser Pro Tyr Ile Ala Ala 625 630 635 640	1920
gct ctg caa ttg cca tct gag aat gtt gct ctc tcc gtg ctg gct tgg Ala Leu Gln Leu Pro Ser Glu Asn Val Ala Leu Ser Val Leu Ala Trp 645 650 655	1968
gca gat aaa cta aac tct ggc aaa gaa aac aaa atg acg gca gat tca Ala Asp Lys Leu Asn Ser Gly Lys Glu Asn Lys Met Thr Ala Asp Ser 660 665 670	2016
ttc tgg aac tgg tta cgg aaa aaa ccc att gaa act caa tcg aaa aca Phe Trp Asn Trp Leu Arg Lys Lys Pro Ile Glu Thr Gln Ser Lys Thr 675 680 685	2064
act gaa gca act gaa gca act gaa gca act gaa gca act gaa gca act Thr Glu Ala Thr Glu Ala Thr Glu Ala Thr Glu Ala Thr Glu Ala Thr 690 695 700	2112
gaa gca act gaa aaa act aca cta att caa caa gct gtc caa tat tgc Glu Ala Thr Glu Lys Thr Thr Leu Ile Gln Gln Ala Val Gln Tyr Cys 705 710 715 720	2160
cag tgc cta gca caa ctg gcg ctg att tat cgc tct acc ggt ctt agc Gln Cys Leu Ala Gln Leu Ala Leu Ile Tyr Arg Ser Thr Gly Leu Ser 725 730 735	2208
gaa agc act tta cgt ctg ttt gtg aca aat cca caa atc ttt ggt ctt Glu Ser Thr Leu Arg Leu Phe Val Thr Asn Pro Gln Ile Phe Gly Leu 740 745 750	2256
acc gcg aaa aca acg tca aca cac aat gta tta tca ctg att atg ctg Thr Ala Lys Thr Thr Ser Thr His Asn Val Leu Ser Leu Ile Met Leu 755 760 765	2304
acg cgt ttt act gac tgg gtt aac tca cta ggt gaa aac gcc tct tct Thr Arg Phe Thr Asp Trp Val Asn Ser Leu Gly Glu Asn Ala Ser Ser 770 775 780	2352
gta ctg acc gag ttt gaa aaa gga aca tta acg gca gaa cta ttg gct Val Leu Thr Glu Phe Glu Lys Gly Thr Leu Thr Ala Glu Leu Leu Ala 785 790 795 800	2400
aac gcc atg aat ctt gat aaa aat cta cta gag caa gcc agt act caa Asn Ala Met Asn Leu Asp Lys Asn Leu Leu Glu Gln Ala Ser Thr Gln 805 810 815	2448

gca caa gct gat ttc tcc aat tgg cca tct atc gac aac cta ttg cag Ala Gln Ala Asp Phe Ser Asn Trp Pro Ser Ile Asp Asn Leu Leu Gln 820 825 830	2496
tgg att aac atc tcg cgt caa ttg aac atc tcg cca caa ggc gtt tct Trp Ile Asn Ile Ser Arg Gln Leu Asn Ile Ser Pro Gln Gly Val Ser 835 840 845	2544
gaa ctg gcg aaa ata tta gac ata gaa tct tct act aat tat gcc caa Glu Leu Ala Lys Ile Leu Asp Ile Glu Ser Ser Thr Asn Tyr Ala Gln 850 855 860	2592
tgg gaa aat gtc gct tca ata tta acc gcc gga cta gat acc caa aaa Trp Glu Asn Val Ala Ser Ile Leu Thr Ala Gly Leu Asp Thr Gln Lys 865 870 875 880	2640
gcc aat acc cta cat gca ttt ctg ggt gag tct cgc agt act gcg tta Ala Asn Thr Leu His Ala Phe Leu Gly Glu Ser Arg Ser Thr Ala Leu 885 890 895	2688
agt aca tac tat att tat tct cat aac caa aaa gat cga gaa gaa aga Ser Thr Tyr Tyr Ile Tyr Ser His Asn Gln Lys Asp Arg Glu Glu Arg 900 905 910	2736
aaa cat acg gta att aaa gac cgt gat gat cta tat caa tac ctg ttg Lys His Thr Val Ile Lys Asp Arg Asp Asp Leu Tyr Gln Tyr Leu Leu 915 920 925	2784
atc gat aac caa gtc tcc gcc gcc atc aaa acc acg gag att gct gaa Ile Asp Asn Gln Val Ser Ala Ala Ile Lys Thr Thr Glu Ile Ala Glu 930 935 940	2832
gct atc gct agt atc caa ctg tat att aac cgc gca ttg aaa aat atg Ala Ile Ala Ser Ile Gln Leu Tyr Ile Asn Arg Ala Leu Lys Asn Met 945 950 955 960	2880
gag gga gat acc gac aca agt gtc act agc cgt tta ttc ttc act aac Glu Gly Asp Thr Asp Thr Ser Val Thr Ser Arg Leu Phe Phe Thr Asn 965 970 975	2928
tgg gat aaa tac aac aaa cgc tac agc acc tgg gct ggt att act aag Trp Asp Lys Tyr Asn Lys Arg Tyr Ser Thr Trp Ala Gly Ile Thr Lys 980 985 990	2976
ctc ctt tac tac cct gaa aac tat atc gat ccg aca ctg cgg atc ggc Leu Leu Tyr Tyr Pro Glu Asn Tyr Ile Asp Pro Thr Leu Arg Ile Gly 995 1000 1005	3024
cag aca aaa atg atg gat acg cta ctg caa tcc atc agc caa agt Gln Thr Lys Met Met Asp Thr Leu Leu Gln Ser Ile Ser Gln Ser 1010 1015 1020	3069
caa ttg aat acc gat acc gta gaa gat gcc ttt aaa tct tat cta Gln Leu Asn Thr Asp Thr Val Glu Asp Ala Phe Lys Ser Tyr Leu 1025 1030 1035	3114
acg tca ttc gaa caa gtg gct aat ctg gaa gtc atc agc gcc tat Thr Ser Phe Glu Gln Val Ala Asn Leu Glu Val Ile Ser Ala Tyr 1040 1045 1050	3159
cat gac aat att aat aat gac caa gga ttg acc tat ttt atc gga His Asp Asn Ile Asn Asn Asp Gln Gly Leu Thr Tyr Phe Ile Gly 1055 1060 1065	3204

cgc agt aaa aca gaa gtg aat caa tat tat tgg cgc agt gta gat Arg Ser Lys Thr Glu Val Asn Gln Tyr Tyr Trp Arg Ser Val Asp 1070 1075 1080	3249
cac aat aaa ttc agc gaa ggt aaa ttc ccc gct aat gcc tgg agc His Asn Lys Phe Ser Glu Gly Lys Phe Pro Ala Asn Ala Trp Ser 1085 1090 1095	3294
gag tgg cac aaa att gac tgc cca att aat ccc tac gaa gat act Glu Trp His Lys Ile Asp Cys Pro Ile Asn Pro Tyr Glu Asp Thr 1100 1105 1110	3339
atc cgc ccg gta gtc tac caa tcc cgc ctg tat att atc tgg ctg Ile Arg Pro Val Val Tyr Gln Ser Arg Leu Tyr Ile Ile Trp Leu 1115 1120 1125	3384
gaa cag aag aag gta act aat cga gca gaa gga gaa gct atc aaa Glu Gln Lys Lys Val Thr Asn Arg Ala Glu Gly Glu Ala Ile Lys 1130 1135 1140	3429
caa gga agc aaa acg acc aca agc tat cat tat gaa ctg aaa ttg Gln Gly Ser Lys Thr Thr Thr Ser Tyr His Tyr Glu Leu Lys Leu 1145 1150 1155	3474
gca cat att cgt tat gac ggc acc tgg aat aca cca att acc ttt Ala His Ile Arg Tyr Asp Gly Thr Trp Asn Thr Pro Ile Thr Phe 1160 1165 1170	3519
gat gta gat gaa aaa ata tct ggt cta aat tta gaa ctg aat aaa Asp Val Asp Glu Lys Ile Ser Gly Leu Asn Leu Glu Leu Asn Lys 1175 1180 1185	3564
gcg tta ggg ctc tat tgt gca agt tat caa ggc aaa gat aaa ttg Ala Leu Gly Leu Tyr Cys Ala Ser Tyr Gln Gly Lys Asp Lys Leu 1190 1195 1200	3609
ctg gtt atg ttt tat aaa aaa cag gag caa tta aat aat tac aca Leu Val Met Phe Tyr Lys Lys Gln Glu Gln Leu Asn Asn Tyr Thr 1205 1210 1215	3654
gaa aaa aca gga aac aca tac aca gca cca ata aaa ggg cta tat Glu Lys Thr Gly Asn Thr Tyr Thr Ala Pro Ile Lys Gly Leu Tyr 1220 1225 1230	3699
atc act tcc aat atg tct cct gag gaa atg aca ccc gaa agt tac Ile Thr Ser Asn Met Ser Pro Glu Glu Met Thr Pro Glu Ser Tyr 1235 1240 1245	3744
aga ctt aat gct cat aaa cag ttt gat acc aac aat gtc gta aga Arg Leu Asn Ala His Lys Gln Phe Asp Thr Asn Asn Val Val Arg 1250 1255 1260	3789
gtc aat aac cgc tat gca gaa agc tac gaa atc cct tca tca gta Val Asn Asn Arg Tyr Ala Glu Ser Tyr Glu Ile Pro Ser Ser Val 1265 1270 1275	3834
aac agt aat aat ggt tat gat tgg gga gag ggc tat ctg agt atg Asn Ser Asn Asn Gly Tyr Asp Trp Gly Glu Gly Tyr Leu Ser Met 1280 1285 1290	3879
gta tac ggc ggg agc att ctg att acc cgt gac cca agc gat aac Val Tyr Gly Gly Ser Ile Leu Ile Thr Arg Asp Pro Ser Asp Asn 1295 1300 1305	3924



tca Ser 1310	aaa Lys 1310	atc Ile	caa Gln	atc Ile	tca Ser	cca Pro 1315	aag Lys	tta Leu	aga Arg	att Ile	att Ile 1320	cat His	aat Asn	gga Gly	3969
tat Tyr 1325	gaa Glu 1325	ggg Gly	cga Arg	caa Gln	cgt Arg	aat Asn 1330	caa Gln	tgc Cys	aat Asn	ttg Leu	atg Met 1335	aag Lys	aaa Lys	tac Tyr	4014
ggc Gly 1340	aag Lys 1340	ctc Leu	ggg Gly	gat Asp	aaa Lys	ttc Phe 1345	att Ile	att Ile	tat Tyr	act Thr	acg Thr 1350	cta Leu	ggg Gly	att Ile	4059
aac Asn 1355	ccc Pro 1355	aat Asn	aat Asn	tta Leu	tca Ser	aat Asn 1360	aaa Lys	aaa Lys	ctt Leu	atc Ile	tac Tyr 1365	cct Pro	gtt Val	tat Tyr	4104
caa Gln 1370	tat Tyr 1370	gaa Glu	gga Gly	aat Asn	gaa Glu	agt Ser 1375	aag Lys	ctt Leu	agt Ser	caa Gln	gga Gly 1380	aga Arg	ctt Leu	ctg Leu	4149
ttt Phe 1385	tat Tyr 1385	cgg Arg	gat Asp	agc Ser	acc Thr	act Thr 1390	aac Asn	ttt Phe	aca Thr	aga Arg	gcc Ala 1395	tgg Trp	ttc Phe	cct Pro	4194
aac Asn 1400	ctt Leu 1400	tct Ser	tct Ser	gac Asp	tca Ser	aaa Lys 1405	gaa Glu	atg Met	tcc Ser	ata Ile	acc Thr 1410	act Thr	ggc Gly	ggg Gly	4239
aac Asn 1415	att Ile 1415	agt Ser	ggg Gly	aat Asn	tat Tyr	ggg Gly 1420	tat Tyr	att Ile	gat Asp	aac Asn	aaa Lys 1425	cat His	agt Ser	gac Asp	4284
aac Asn 1430	aaa Lys 1430	cca Pro	ttc Phe	gaa Glu	gaa Glu	tat Tyr 1435	ttc Phe	tat Tyr	atg Met	gac Asp	gac Asp 1440	cac His	ggc Gly	ggg Gly	4329
att Ile 1445	gac Asp 1445	act Thr	gac Asp	gtt Val	tcg Ser	gag Glu 1450	cca Pro	ata Ile	ttt Phe	att Ile	aat Asn 1455	aca Thr	aaa Lys	att Ile	4374
cag Gln 1460	cct Pro 1460	tca Ser	aat Asn	gtt Val	aaa Lys	atc Ile 1465	ata Ile	gtg Val	aaa Lys	aca Thr	gtg Val 1470	aag Lys	gat Asp	gat Asp	4419
gga Gly 1475	aaa Lys 1475	tta Leu	gac Asp	agt Ser	aaa Lys	cca Pro 1480	tat Tyr	ata Ile	gca Ala	gaa Glu	gac Asp 1485	aaa Lys	gtt Val	tca Ser	4464
gtt Val 1490	aaa Lys 1490	ccg Pro	aca Thr	cca Pro	aac Asn	ttt Phe 1495	gaa Glu	gaa Glu	atg Met	tgt Cys	tat Tyr 1500	cag Gln	ttt Phe	aat Asn	4509
aat Asn 1505	ctc Leu 1505	gat Asp	caa Gln	ata Ile	gat Asp	gtc Val 1510	tcc Ser	act Thr	cta Leu	gta Val	ttt Phe 1515	aaa Lys	aat Asn	aat Asn	4554
gaa Glu 1520	gca Ala 1520	agt Ser	att Ile	gat Asp	atc Ile	acc Thr 1525	ttt Phe	aca Thr	gca Ala	tct Ser	gct Ala 1530	gac Asp	gca Ala	ttt Phe	4599
gaa Glu 1535	agt Ser 1535	ggg Gly	aaa Lys	gaa Glu	caa Gln	cgt Arg 1540	aat Asn	cta Leu	ggg Gly	gaa Glu	gaa Glu 1545	cat His	ttc Phe	agt Ser	4644

att Ile 1550	cgt Arg	att Ile	atc Ile	aaa Lys	aaa Lys	gcg Ala 1555	aat Asn	gtt Val	aat Asn	gat Asp	gtc Val 1560	ctg Leu	acc Thr	ctt Leu	4689
cac His 1565	cac His	gat Asp	cca Pro	agt Ser	ggg Gly	gca Ala 1570	caa Gln	tat Tyr	atg Met	caa Gln	tgg Trp 1575	gga Gly	gcc Ala	tat Tyr	4734
cgt Arg 1580	act Thr	cgc Arg	ctt Leu	aat Asn	acc Thr	ctg Leu 1585	ttt Phe	gcc Ala	cgt Arg	aaa Lys	tta Leu 1590	att Ile	agc Ser	cgc Arg	4779
gcc Ala 1595	aat Asn	gcg Ala	ggg Gly	atc Ile	gac Asp	act Thr 1600	att Ile	ttg Leu	agt Ser	atg Met	gaa Glu 1605	act Thr	cag Gln	aat Asn	4824
att Ile 1610	caa Gln	gag Glu	cca Pro	caa Gln	tta Leu	ggc Gly 1615	aaa Lys	ggc Gly	ttt Phe	tat Tyr	gtt Val 1620	aat Asn	ttc Phe	act Thr	4869
ctt Leu 1625	cct Pro	aaa Lys	tat Tyr	gat Asp	caa Gln	aac Asn 1630	aca Thr	cat His	ggg Gly	aat Asn	gaa Glu 1635	cgc Arg	cag Gln	ttt Phe	4914
aaa Lys 1640	att Ile	cat His	ata Ile	ggg Gly	aat Asn	att Ile 1645	gct Ala	ggg Gly	gat Asp	aat Asn	aca Thr 1650	atg Met	cgg Arg	cca Pro	4959
tat Tyr 1655	tac Tyr	caa Gln	gga Gly	ata Ile	ttg Leu	gct Ala 1660	gac Asp	acc Thr	gaa Glu	acc Thr	agt Ser 1665	gtc Val	gtt Val	ctt Leu	5004
ttt Phe 1670	gtc Val	cct Pro	tat Tyr	gag Glu	aaa Lys	caa Gln 1675	tct Ser	tat Tyr	acc Thr	aat Asn	gaa Glu 1680	ggg Gly	gtt Val	aga Arg	5049
tta Leu 1685	gga Gly	gtt Val	gaa Glu	tac Tyr	aaa Lys	aaa Lys 1690	gta Val	tct Ser	tac Tyr	cta Leu	ggc Gly 1695	gtc Val	tgg Trp	gaa Glu	5094
ccc Pro 1700	gct Ala	ttc Phe	ttc Phe	tat Tyr	ttc Phe	aat Asn 1705	gaa Glu	att Ile	caa Gln	cag Gln	aag Lys 1710	ttt Phe	att Ile	ctg Leu	5139
att Ile 1715	aat Asn	gat Asp	gcc Ala	gat Asp	cat His	aac Asn 1720	tca Ser	gca Ala	atg Met	act Thr	caa Gln 1725	tct Ser	ggg Gly	gaa Glu	5184
aaa Lys 1730	aca Thr	gga Gly	att Ile	aaa Lys	aaa Lys	tac Tyr 1735	aaa Lys	ggc Gly	ttt Phe	ctt Leu	gac Asp 1740	gtt Val	tct Ser	att Ile	5229
ctt Leu 1745	atc Ile	gat Asp	cat His	cag Gln	cac His	aca Thr 1750	gaa Glu	cca Pro	atg Met	gac Asp	ttc Phe 1755	aac Asn	ggc Gly	gcc Ala	5274
aac Asn 1760	agc Ser	ctc Leu	tac Tyr	ttc Phe	tgg Trp	gaa Glu 1765	ctg Leu	ttc Phe	tac Tyr	tat Tyr	acc Thr 1770	ccg Pro	atg Met	ctg Leu	5319
atc Ile 1775	gct Ala	caa Gln	cgt Arg	ttg Leu	cta Leu	cac His 1780	gag Glu	caa Gln	aat Asn	ttc Phe	gat Asp 1785	gaa Glu	gct Ala	aac Asn	5364

cgt Arg 1790	tgg Trp	ctg Leu	aaa Lys	tat Tyr	gtc Val	tgg Trp 1795	aat Asn	cca Pro	tct Ser	ggg Gly	cat His 1800	att Ile	gcc Ala	aat Asn	5409
ggg Gly 1805	caa Gln	aaa Lys	cag Gln	cac His	ccc Pro	cac His 1810	aac Asn	tgg Trp	aat Asn	gtc Val	cgc Arg 1815	cca Pro	tta Leu	caa Gln	5454
gag Glu 1820	gac Asp	acc Thr	agt Ser	tgg Trp	aac Asn	gat Asp 1825	gat Asp	cca Pro	ttg Leu	gat Asp	aca Thr 1830	ttt Phe	gat Asp	ccc Pro	5499
gat Asp 1835	gcc Ala	atc Ile	gct Ala	caa Gln	cat His	gat Asp 1840	ccg Pro	atg Met	cac His	tac Tyr	aaa Lys 1845	gtc Val	gcc Ala	acc Thr	5544
ttt Phe 1850	atg Met	tgc Cys	gcc Ala	ctt Leu	gat Asp	cta Leu 1855	ttg Leu	atc Ile	gaa Glu	cag Gln	gga Gly 1860	gat Asp	tac Tyr	gcc Ala	5589
tat Tyr 1865	cgc Arg	cag Gln	ttg Leu	gaa Glu	cgg Arg	gac Asp 1870	aca Thr	ctc Leu	gcc Ala	gaa Glu	gcc Ala 1875	aaa Lys	atg Met	tgg Trp	5634
tat Tyr 1880	atg Met	cag Gln	gca Ala	ctg Leu	cat His	cta Leu 1885	tta Leu	ggc Gly	gat Asp	aaa Lys	cct Pro 1890	cat His	tta Leu	tta Leu	5679
ctc Leu 1895	agt Ser	tca Ser	aca Thr	tgg Trp	agt Ser	gat Asp 1900	cca Pro	gag Glu	cta Leu	aaa Lys	gaa Glu 1905	gcc Ala	gca Ala	gat Asp	5724
ctt Leu 1910	gaa Glu	aaa Lys	caa Gln	cag Gln	gca Ala	cat His 1915	gcc Ala	aaa Lys	gca Ala	ata Ile	gca Ala 1920	gat Asp	tta Leu	cga Arg	5769
caa Gln 1925	ggc Gly	cag Gln	cct Pro	aaa Lys	gat Asp	gga Gly 1930	agc Ser	aac Asn	aca Thr	gat Asp	ctt Leu 1935	ttc Phe	ctg Leu	cca Pro	5814
cag Gln 1940	gtc Val	aac Asn	gaa Glu	gtg Val	atg Met	ttg Leu 1945	agc Ser	tat Tyr	tgg Trp	cag Gln	aaa Lys 1950	ctg Leu	gaa Glu	caa Gln	5859
cgg Arg 1955	tta Leu	tat Tyr	aac Asn	ctg Leu	cgc Arg	cat His 1960	aac Asn	ctc Leu	tct Ser	att Ile	gat Asp 1965	ggg Gly	caa Gln	cct Pro	5904
tta Leu 1970	cat His	ttg Leu	cct Pro	att Ile	ttc Phe	gcg Ala 1975	aca Thr	ccg Pro	gca Ala	gat Asp	cca Pro 1980	aaa Lys	gcg Ala	ctg Leu	5949
ctc Leu 1985	agc Ser	gcc Ala	gct Ala	gtc Val	gcc Ala	agt Ser 1990	tca Ser	caa Gln	ggg Gly	gga Gly	agc Ser 1995	aat Asn	ctt Leu	ccg Pro	5994
tca Ser 2000	gag Glu	ttt Phe	ata Ile	tca Ser	gtt Val	tgg Trp 2005	cgt Arg	ttc Phe	cca Pro	cat His	atg Met 2010	ctg Leu	gaa Glu	aac Asn	6039
gcc Ala 2015	cgc Arg	agt Ser	atg Met	gtc Val	agt Ser	caa Gln 2020	ctc Leu	acc Thr	caa Gln	ttc Phe	ggc Gly 2025	tcc Ser	aca Thr	tta Leu	6084

caa aat att atc gaa cgt cag gat gcg gaa gca tta aac acg ctg Gln Asn Ile Ile Glu Arg Gln Asp Ala Glu Ala Leu Asn Thr Leu 2030 2035 2040	6129
tta cag aat caa gcg gcg gaa ctg ata ttg acc aat ctc agc ata Leu Gln Asn Gln Ala Ala Glu Leu Ile Leu Thr Asn Leu Ser Ile 2045 2050 2055	6174
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gaa aaa acc cgc gcc gga gct aaa tcg cgt ttt gat agc tac agc Glu Lys Thr Arg Ala Gly Ala Lys Ser Arg Phe Asp Ser Tyr Ser 2075 2080 2085	6264
aaa ttc tac gat gaa gat atc aac gca ggt gaa aaa cag gcg atg Lys Phe Tyr Asp Glu Asp Ile Asn Ala Gly Glu Lys Gln Ala Met 2090 2095 2100	6309
gcg ttg cga gcc tcc gtc gca ggc atc tct act gca ctt caa gca Ala Leu Arg Ala Ser Val Ala Gly Ile Ser Thr Ala Leu Gln Ala 2105 2110 2115	6354
tca cat ctg gca ggc gca gcg ctt gat ttg gct ccc aac atc ttt Ser His Leu Ala Gly Ala Ala Leu Asp Leu Ala Pro Asn Ile Phe 2120 2125 2130	6399
ggc ttc gct gat ggc ggt agc cat tgg gga gca att gcc caa gcc Gly Phe Ala Asp Gly Gly Ser His Trp Gly Ala Ile Ala Gln Ala 2135 2140 2145	6444
aca agt aat gtc atg gaa ttc tcc gcc agt gtc atg agc acc gaa Thr Ser Asn Val Met Glu Phe Ser Ala Ser Val Met Ser Thr Glu 2150 2155 2160	6489
gcg gat aaa atc agc cag tct gaa gcc tac cgt cgg cgt cga cag Ala Asp Lys Ile Ser Gln Ser Glu Ala Tyr Arg Arg Arg Arg Gln 2165 2170 2175	6534
gag tgg aaa atc cag cgt aac aac gct gat gca gag ttg aaa caa Glu Trp Lys Ile Gln Arg Asn Asn Ala Asp Ala Glu Leu Lys Gln 2180 2185 2190	6579
atc gat gct caa ctt caa tca tta gtc gta cgc cgt gaa gcc gcc Ile Asp Ala Gln Leu Gln Ser Leu Val Val Arg Arg Glu Ala Ala 2195 2200 2205	6624
gtg ttg cag aaa acc agc ctg aaa acc caa caa gag cag acg cac Val Leu Gln Lys Thr Ser Leu Lys Thr Gln Gln Glu Gln Thr His 2210 2215 2220	6669
gca caa ctg acc ttc ctg caa cat aag ttc agc aat cag gca tta Ala Gln Leu Thr Phe Leu Gln His Lys Phe Ser Asn Gln Ala Leu 2225 2230 2235	6714
tac aac tgg ctg cgt ggt cgg ctg tcc gcc att tac ttc cag ttc Tyr Asn Trp Leu Arg Gly Arg Leu Ser Ala Ile Tyr Phe Gln Phe 2240 2245 2250	6759
tat gat tta gcg gta gcc cgt tgc ctg atg gct gaa atg gcc tat Tyr Asp Leu Ala Val Ala Arg Cys Leu Met Ala Glu Met Ala Tyr 2255 2260 2265	6804

cgt Arg	tgg Trp	gag Glu	act Thr	aac Asn	gat Asp	gcc Ala	gca Ala	gca Ala	cgc Arg	ttt Phe	atc Ile	aag Lys	ccc Pro	ggc Gly	6849
2270						2275					2280				
gcc Ala	tgg Trp	cag Gln	gga Gly	acc Thr	cat His	gcc Ala	ggg Gly	ctg Leu	ctg Leu	gcg Ala	ggg Gly	gaa Glu	acc Thr	tta Leu	6894
2285						2290					2295				
atg Met	ctg Leu	aat Asn	cta Leu	gca Ala	cag Gln	atg Met	gaa Glu	gat Asp	gcc Ala	cac His	ctg Leu	aaa Lys	cag Gln	gag Glu	6939
2300						2305					2310				
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2315						2320					2325				
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2330						2335					2340				
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2345						2350					2355				
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2360						2365					2370				
att Ile	tcg Ser	tta Leu	gct Ala	gac Asp	tta Leu	caa Gln	att Ile	cgt Arg	cac His	gat Asp	tac Tyr	cca Pro	gaa Glu	aac Asn	7164
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agt Ser	gga Gly	gcc Ala	ggg Gly	aac Asn	gtc Val	cgc Arg	cgg Arg	att Ile	aaa Lys	cag Gln	atc Ile	agt Ser	gtc Val	acc Thr	7209
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tct Ser	tat Tyr	ggc Gly	gga Gly	gat Asp	gcc Ala	acc Thr	ggg Gly	tta Leu	gcc Ala	aaa Lys	ggg Gly	tgt Cys	aaa Lys	gcg Ala	7299
2420						2425					2430				
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2495															

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&lt;211&gt; 2499

&lt;212&gt; PRT

&lt;213&gt; Photorhabdus luminescens

&lt;400&gt; 4

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 Lys Val Lys Asp Lys Leu Ser Trp Ser Gln Thr Gln Ser Leu Tyr Leu  
 35 40 45  
 Glu Ala Gln Gln Val Gln Lys Asp Asn Leu Leu His Glu Ala Arg Ile  
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 Leu Lys Arg Ala Asn Pro His Leu Gln Ser Ala Val His Leu Ala Leu  
 65 70 75 80  
 Thr Ala Pro His Ala Asp Gln Gln Gly Tyr Asn Ser Arg Phe Gly Asn  
 85 90 95  
 Arg Ala Ser Lys Tyr Ala Ala Pro Gly Ala Ile Ser Ser Met Phe Ser  
 100 105 110  
 Leu Ala Ala Tyr Leu Thr Glu Leu Tyr Arg Gln Ala Arg Asn Leu His  
 115 120 125  
 Ala Glu Gly Ser Ile Tyr His Leu Asp Thr Arg Arg Pro Asp Leu Lys  
 130 135 140  
 Ser Leu Val Leu Ser Gln Lys Asn Met Asn Thr Glu Ile Ser Thr Leu  
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 165 170 175  
 Leu Asn Ser His Ala Lys Val Met Glu Lys Leu Ser Thr Phe Arg Thr  
 180 185 190  
 Ser Gly Ser Met Pro Tyr His Asp Ala Tyr Glu Ser Val Arg Lys Ile  
 195 200 205  
 Ile Gln Leu Gln Ala Pro Val Phe Glu Gln Ser Ser Thr Leu Thr Asp  
 210 215 220  
 Thr Pro Ile Thr Lys Leu Met Tyr Gln Ile Ser Leu Leu Gly Ile Asn  
 225 230 235 240  
 Ala Ser Val Ser Pro Glu Leu Phe Thr Ile Leu Thr Gln Lys Ile Lys  
 245 250 255  
 Pro Ala Thr Asn Ala Asp Asn Thr Asn Glu Leu Lys Lys Leu Tyr Lys  
 260 265 270  
 Lys Asn Phe Gly Glu Ile Lys Ser Ile Gln Met Ala Arg Ala Glu Tyr  
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Leu Lys Ser Tyr Tyr Asn Leu Thr Asp Lys Glu Leu Asn Gln Phe Ser
 290                               295                 300

Lys Lys Ile Lys Gln Ile Asp Ser Leu Trp Asn Ile Gly Asp Glu Ile
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Thr Gln Tyr His Leu Leu Lys Phe Asn Lys Ala Ile Asn Leu Ser Arg
                325                               330                 335

Ser Thr Glu Leu Ser Pro Ile Ile Leu Asn Ser Ile Ala Ile Asp Ile
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Leu Lys Lys Thr Pro Pro Glu Asp Asp Ser Asp Asn Pro Phe Arg Asp
 355                               360                 365

Asp Pro Asp Tyr Leu Glu Ser Phe Gln Asp Leu Asp Leu Ser Asp Glu
 370                               375                 380

Pro Asp Ile Asp Glu Asp Val Leu Arg Glu Ala Leu Arg Val Lys Asp
385                               390                 395                 400

Tyr Met Gln Arg Tyr Gly Ile Asp Ala Glu Thr Ala Leu Ile Leu Cys
                405                               410                 415

Lys Ala Pro Ile Ser Glu Asn Pro Ser His Pro Asp Leu Ser Lys Leu
                420                               425                 430

Leu Ala Asp Ile His Gln Leu Thr Ile Asp Glu Leu Gly Val Leu Leu
 435                               440                 445

Val Ala Ile Asp Glu Gly Lys Thr Asp Leu Ser Gln Ile Thr His Asp
 450                               455                 460

Asn Leu Ala Val Leu Ile Ser Lys Leu Tyr Ser Val Thr Asn Trp Leu
465                               470                 475                 480

Arg Thr Arg Lys Trp Ser Val Tyr Gln Leu Phe Val Met Thr Thr Asp
                485                               490                 495

Lys Tyr Asn Lys Thr Leu Thr Pro Glu Ile Asn Asn Leu Leu Asp Thr
                500                               505                 510

Val Tyr Asn Gly Leu Gln Asn Phe Tyr Lys Asp Asn Leu Leu Lys Ile
 515                               520                 525

Lys Asp Asn Leu Leu Lys Ala Lys Glu Ser Leu Pro Glu Asp Lys Asp
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Asn Leu Pro Lys Ala Glu Gln Tyr Leu Leu Glu Ala Glu Lys Tyr Leu
545                               550                 555                 560

Leu Ala Ala Glu Lys Tyr Leu Leu Ala Ala Glu Lys Tyr Leu Leu Glu
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Ala Asn Lys Asn Pro Leu Glu Ala Lys Lys Ala Leu Lys Glu Tyr Glu
                580                               585                 590

Lys Asn Gln Glu Ala Tyr Glu Lys Asn Leu Lys Glu His Glu Lys Tyr
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Leu Leu Lys Ala Gly Glu Asn Leu Pro Ala Ile Lys Glu Asn Leu Leu
 610                               615                 620

Lys Ile Lys Glu Asn Leu Pro Lys Ala Ile Ser Pro Tyr Ile Ala Ala

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Trp	Asp	Lys	Tyr	Asn	Lys	Arg	Tyr	Ser	Thr	Trp	Ala	Gly	Ile	Thr	Lys	980	985	990
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Gln	Thr	Lys	Met	Met	Asp	Thr	Leu	Leu	Gln	Ser	Ile	Ser	Gln	Ser		1010	1015	1020
Gln	Leu	Asn	Thr	Asp	Thr	Val	Glu	Asp	Ala	Phe	Lys	Ser	Tyr	Leu		1025	1030	1035
Thr	Ser	Phe	Glu	Gln	Val	Ala	Asn	Leu	Glu	Val	Ile	Ser	Ala	Tyr		1040	1045	1050
His	Asp	Asn	Ile	Asn	Asn	Asp	Gln	Gly	Leu	Thr	Tyr	Phe	Ile	Gly		1055	1060	1065
Arg	Ser	Lys	Thr	Glu	Val	Asn	Gln	Tyr	Tyr	Trp	Arg	Ser	Val	Asp		1070	1075	1080
His	Asn	Lys	Phe	Ser	Glu	Gly	Lys	Phe	Pro	Ala	Asn	Ala	Trp	Ser		1085	1090	1095
Glu	Trp	His	Lys	Ile	Asp	Cys	Pro	Ile	Asn	Pro	Tyr	Glu	Asp	Thr		1100	1105	1110
Ile	Arg	Pro	Val	Val	Tyr	Gln	Ser	Arg	Leu	Tyr	Ile	Ile	Trp	Leu		1115	1120	1125
Glu	Gln	Lys	Lys	Val	Thr	Asn	Arg	Ala	Glu	Gly	Glu	Ala	Ile	Lys		1130	1135	1140
Gln	Gly	Ser	Lys	Thr	Thr	Thr	Ser	Tyr	His	Tyr	Glu	Leu	Lys	Leu		1145	1150	1155
Ala	His	Ile	Arg	Tyr	Asp	Gly	Thr	Trp	Asn	Thr	Pro	Ile	Thr	Phe		1160	1165	1170
Asp	Val	Asp	Glu	Lys	Ile	Ser	Gly	Leu	Asn	Leu	Glu	Leu	Asn	Lys		1175	1180	1185
Ala	Leu	Gly	Leu	Tyr	Cys	Ala	Ser	Tyr	Gln	Gly	Lys	Asp	Lys	Leu		1190	1195	1200
Leu	Val	Met	Phe	Tyr	Lys	Lys	Gln	Glu	Gln	Leu	Asn	Asn	Tyr	Thr		1205	1210	1215
Glu	Lys	Thr	Gly	Asn	Thr	Tyr	Thr	Ala	Pro	Ile	Lys	Gly	Leu	Tyr		1220	1225	1230
Ile	Thr	Ser	Asn	Met	Ser	Pro	Glu	Glu	Met	Thr	Pro	Glu	Ser	Tyr		1235	1240	1245
Arg	Leu	Asn	Ala	His	Lys	Gln	Phe	Asp	Thr	Asn	Asn	Val	Val	Arg		1250	1255	1260
Val	Asn	Asn	Arg	Tyr	Ala	Glu	Ser	Tyr	Glu	Ile	Pro	Ser	Ser	Val		1265	1270	1275
Asn	Ser	Asn	Asn	Gly	Tyr	Asp	Trp	Gly	Glu	Gly	Tyr	Leu	Ser	Met		1280	1285	1290

Val	Tyr	Gly	Gly	Ser	Ile	Leu	Ile	Thr	Arg	Asp	Pro	Ser	Asp	Asn
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Ser	Lys	Ile	Gln	Ile	Ser	Pro	Lys	Leu	Arg	Ile	Ile	His	Asn	Gly
1310						1315					1320			
Tyr	Glu	Gly	Arg	Gln	Arg	Asn	Gln	Cys	Asn	Leu	Met	Lys	Lys	Tyr
1325						1330					1335			
Gly	Lys	Leu	Gly	Asp	Lys	Phe	Ile	Ile	Tyr	Thr	Thr	Leu	Gly	Ile
1340						1345					1350			
Asn	Pro	Asn	Asn	Leu	Ser	Asn	Lys	Lys	Leu	Ile	Tyr	Pro	Val	Tyr
1355						1360					1365			
Gln	Tyr	Glu	Gly	Asn	Glu	Ser	Lys	Leu	Ser	Gln	Gly	Arg	Leu	Leu
1370						1375					1380			
Phe	Tyr	Arg	Asp	Ser	Thr	Thr	Asn	Phe	Thr	Arg	Ala	Trp	Phe	Pro
1385						1390					1395			
Asn	Leu	Ser	Ser	Asp	Ser	Lys	Glu	Met	Ser	Ile	Thr	Thr	Gly	Gly
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His	His	Asp	Pro	Ser	Gly	Ala	Gln	Tyr	Met	Gln	Trp	Gly	Ala	Tyr
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Lys	Ile	His	Ile	Gly	Asn	Ile	Ala	Gly	Asp	Asn	Thr	Met	Arg	Pro
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Phe	Val	Pro	Tyr	Glu	Lys	Gln	Ser	Tyr	Thr	Asn	Glu	Gly	Val	Arg
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Leu	Gly	Val	Glu	Tyr	Lys	Lys	Val	Ser	Tyr	Leu	Gly	Val	Trp	Glu
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Pro	Ala	Phe	Phe	Tyr	Phe	Asn	Glu	Ile	Gln	Gln	Lys	Phe	Ile	Leu
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Arg Leu 1955	Tyr Asn Leu Arg His 1960	Asn Leu Ser Ile Asp 1965	Gly Gln Pro
Leu His 1970	Leu Pro Ile Phe Ala 1975	Thr Pro Ala Asp Pro 1980	Lys Ala Leu
Leu Ser 1985	Ala Ala Val Ala Ser 1990	Ser Gln Gly Gly Ser 1995	Asn Leu Pro
Ser Glu 2000	Phe Ile Ser Val Trp 2005	Arg Phe Pro His Met 2010	Leu Glu Asn
Ala Arg 2015	Ser Met Val Ser Gln 2020	Leu Thr Gln Phe Gly 2025	Ser Thr Leu
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Glu Lys 2075	Thr Arg Ala Gly Ala 2080	Lys Ser Arg Phe Asp 2085	Ser Tyr Ser
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Gly Phe 2135	Ala Asp Gly Gly Ser 2140	His Trp Gly Ala Ile 2145	Ala Gln Ala
Thr Ser 2150	Asn Val Met Glu Phe 2155	Ser Ala Ser Val Met 2160	Ser Thr Glu
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Glu Trp 2180	Lys Ile Gln Arg Asn 2185	Asn Ala Asp Ala Glu 2190	Leu Lys Gln
Ile Asp 2195	Ala Gln Leu Gln Ser 2200	Leu Val Val Arg Arg 2205	Glu Ala Ala
Val Leu 2210	Gln Lys Thr Ser Leu 2215	Lys Thr Gln Gln Glu 2220	Gln Thr His
Ala Gln 2225	Leu Thr Phe Leu Gln 2230	His Lys Phe Ser Asn 2235	Gln Ala Leu
Tyr Asn 2240	Trp Leu Arg Gly Arg 2245	Leu Ser Ala Ile Tyr 2250	Phe Gln Phe

Tyr Asp Leu Ala Val Ala Arg Cys Leu Met Ala Glu Met Ala Tyr  
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 Arg Trp Glu Thr Asn Asp Ala Ala Ala Arg Phe Ile Lys Pro Gly  
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 Ala Trp Gln Gly Thr His Ala Gly Leu Leu Ala Gly Glu Thr Leu  
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Lys Ala Asn Arg Leu His Glu Ala Ser Ile Leu Lys Arg Ala Asn Pro	
20 25 30	
caa tta caa aat gcg gta cat ctt gct tta acc aca ccc cat gct gac	144
Gln Leu Gln Asn Ala Val His Leu Ala Leu Thr Thr Pro His Ala Asp	
35 40 45	
cag caa ggt tat aac agt aaa ttt ggt ggc cgc gcc agc cag tat gtc	192
Gln Gln Gly Tyr Asn Ser Lys Phe Gly Gly Arg Ala Ser Gln Tyr Val	
50 55 60	
gct ccc ggc gca gtt gct tcc atg ttc tct ccc gcc gct tat ctg acc	240
Ala Pro Gly Ala Val Ala Ser Met Phe Ser Pro Ala Ala Tyr Leu Thr	
65 70 75 80	
gaa ctt tat cgt cag gca cag gat tta cat aaa aaa gag tcc att tat	288
Glu Leu Tyr Arg Gln Ala Gln Asp Leu His Lys Lys Glu Ser Ile Tyr	
85 90 95	
cat ctg gat aaa cgc cgc cct gat tta aaa tca ctg aca ctc agc cag	336
His Leu Asp Lys Arg Arg Pro Asp Leu Lys Ser Leu Thr Leu Ser Gln	
100 105 110	
caa aat atg gat gat gaa gtt tct aca ctt tct cta tct aat aag gtg	384
Gln Asn Met Asp Asp Glu Val Ser Thr Leu Ser Leu Ser Asn Lys Val	
115 120 125	
ttg ctg gaa ggg atc aag acg ctg acc ggg ctg gaa ggc cat act aac	432
Leu Leu Glu Gly Ile Lys Thr Leu Thr Gly Leu Glu Gly His Thr Asn	
130 135 140	
gtg atg aaa gcg cta tca acc ttt cgc tct tct ggc tct ctg cca tat	480
Val Met Lys Ala Leu Ser Thr Phe Arg Ser Ser Gly Ser Leu Pro Tyr	
145 150 155 160	
cac gat gct tac gaa agt gta cgt aag gtt att caa tta caa gct ccg	528
His Asp Ala Tyr Glu Ser Val Arg Lys Val Ile Gln Leu Gln Ala Pro	
165 170 175	
ata ttc gac caa gtt ggt cca tcc cca gaa aca gat atc gcc aat ctg	576
Ile Phe Asp Gln Val Gly Pro Ser Pro Glu Thr Asp Ile Ala Asn Leu	
180 185 190	
aca tat caa gct tcc ctg ctg gga att aat gct tct gtc ttg cct gaa	624
Thr Tyr Gln Ala Ser Leu Leu Gly Ile Asn Ala Ser Val Leu Pro Glu	
195 200 205	
ttg ttt aag act ctg aca gaa gag atc acc gaa gtt aat gca aat gag	672
Leu Phe Lys Thr Leu Thr Glu Glu Ile Thr Glu Val Asn Ala Asn Glu	
210 215 220	
aag ttt aag aaa aac ttt ggg gat aga gag cca tca gaa ctt ctc act	720
Lys Phe Lys Lys Asn Phe Gly Asp Arg Glu Pro Ser Glu Leu Leu Thr	
225 230 235 240	
ctg gat gcc ttg aaa cac tat tac aat tta acc aat gaa gaa tta gaa	768

Leu	Asp	Ala	Leu	Lys	His	Tyr	Tyr	Asn	Leu	Thr	Asn	Glu	Glu	Leu	Glu	
				245					250					255		
cag	ttt	tta	aat	cac	gta	tta	ata	gaa	agt	aac	tct	act	tac	aca	aat	816
Gln	Phe	Leu	Asn	His	Val	Leu	Ile	Glu	Ser	Asn	Ser	Thr	Tyr	Thr	Asn	
			260					265				270				
aac	caa	ctt	att	aat	ata	agc	att	gat	aca	tca	ggg	aag	ata	caa	ttg	864
Asn	Gln	Leu	Ile	Asn	Ile	Ser	Ile	Asp	Thr	Ser	Gly	Lys	Ile	Gln	Leu	
		275					280					285				
agc	cgc	ata	aca	cga	aca	cct	gac	tta	aat	tat	aac	aac	ctc	aat	tac	912
Ser	Arg	Ile	Thr	Arg	Thr	Pro	Asp	Leu	Asn	Tyr	Asn	Asn	Leu	Asn	Tyr	
	290					295					300					
atg	aat	tta	tat	cct	att	caa	aac	aga	cgt	ttt	tat	gtt	gat	att	agc	960
Met	Asn	Leu	Tyr	Pro	Ile	Gln	Asn	Arg	Arg	Phe	Tyr	Val	Asp	Ile	Ser	
305					310					315					320	
tat	aag	aaa	aaa	gct	ggg	caa	gtt	agt	att	aga	ctc	agc	aag	ccc	cag	1008
Tyr	Lys	Lys	Lys	Ala	Gly	Gln	Val	Ser	Ile	Arg	Leu	Ser	Lys	Pro	Gln	
				325					330					335		
tct	aaa	tat	ctc	aaa	ggg	ata	tat	aaa	gcg	acc	ata	gaa	aac	acg	aac	1056
Ser	Lys	Tyr	Leu	Lys	Gly	Ile	Tyr	Lys	Ala	Thr	Ile	Glu	Asn	Thr	Asn	
			340					345					350			
tat	tct	tcc	cca	aca	ttt	gaa	tta	acc	gac	aaa	gat	att	caa	aaa	gaa	1104
Tyr	Ser	Ser	Pro	Thr	Phe	Glu	Leu	Thr	Asp	Lys	Asp	Ile	Gln	Lys	Glu	
		355					360					365				
ttt	act	ctt	cta	agt	tat	cgt	tat	aaa	gaa	aat	agt	gat	tcg	aat	ata	1152
Phe	Thr	Leu	Leu	Ser	Tyr	Arg	Tyr	Lys	Glu	Asn	Ser	Asp	Ser	Asn	Ile	
	370					375					380					
tct	gac	tca	tct	tat	gcc	aag	ttc	aaa	att	cag	gat	tat	tca	cct	gca	1200
Ser	Asp	Ser	Ser	Tyr	Ala	Lys	Phe	Lys	Ile	Gln	Asp	Tyr	Ser	Pro	Ala	
385					390					395					400	
att	ttt	ctg	tta	aaa	ctt	aat	aaa	acc	att	cgt	ttg	tcc	cac	gca	aca	1248
Ile	Phe	Leu	Leu	Lys	Leu	Asn	Lys	Thr	Ile	Arg	Leu	Ser	His	Ala	Thr	
				405					410					415		
aaa	ctt	ctg	cca	aca	gta	ctg	gaa	aaa	att	gtc	ttc	aat	atc	aat	cag	1296
Lys	Leu	Leu	Pro	Thr	Val	Leu	Glu	Lys	Ile	Val	Phe	Asn	Ile	Asn	Gln	
			420					425					430			
aaa	cta	gat	atc	aat	gca	gaa	ata	tta	aag	aaa	ata	ttt	cgc	gtt	aaa	1344
Lys	Leu	Asp	Ile	Asn	Ala	Glu	Ile	Leu	Lys	Lys	Ile	Phe	Arg	Val	Lys	
		435					440					445				
tac	tat	atg	caa	cgt	tac	ggg	att	gat	gct	gag	act	gca	ttg	gta	ctg	1392
Tyr	Tyr	Met	Gln	Arg	Tyr	Gly	Ile	Asp	Ala	Glu	Thr	Ala	Leu	Val	Leu	
	450					455					460					
tgc	aaa	gta	tca	act	aat	ata	att	aat	cct	tct	agt	tcc	gat	cta	atc	1440
Cys	Lys	Val	Ser	Thr	Asn	Ile	Ile	Asn	Pro	Ser	Ser	Ser	Asp	Leu	Ile	
465					470					475					480	
aaa	tta	cta	gca	aat	att	cat	cag	tta	act	gtt	aat	gag	ctg	aat	tta	1488
Lys	Leu	Leu	Ala	Asn	Ile	His	Gln	Leu	Thr	Val	Asn	Glu	Leu	Asn	Leu	
				485					490					495		
ctg	ctg	gtt	gcc	ata	ggg	gaa	gga	tca	acc	aat	cta	tct	gag	ctc	agt	1536

Leu	Leu	Val	Ala	Ile	Gly	Glu	Gly	Ser	Thr	Asn	Leu	Ser	Glu	Leu	Ser		
			500					505					510				
gat	aac	aat	cta	tct	gtt	ctg	att	gat	aaa	ctt	tat	agc	att	acc	cag		1584
Asp	Asn	Asn	Leu	Ser	Val	Leu	Ile	Asp	Lys	Leu	Tyr	Ser	Ile	Thr	Gln		
		515					520					525					
tgg	ttg	cgt	aca	cgg	aaa	tgg	aat	atg	tac	ctg	ctg	ttt	atg	atg	act		1632
Trp	Leu	Arg	Thr	Arg	Lys	Trp	Asn	Met	Tyr	Leu	Leu	Phe	Met	Met	Thr		
	530					535					540						
acc	acc	gac	tat	aac	caa	acc	ctg	acg	ccg	gaa	att	cag	aac	ctg	cta		1680
Thr	Thr	Asp	Tyr	Asn	Gln	Thr	Leu	Thr	Pro	Glu	Ile	Gln	Asn	Leu	Leu		
545					550					555					560		
gat	gct	gtt	tac	aat	ggg	ttg	caa	aac	ttt	aac	agt	aaa	aac	gaa	gca		1728
Asp	Ala	Val	Tyr	Asn	Gly	Leu	Gln	Asn	Phe	Asn	Ser	Lys	Asn	Glu	Ala		
				565					570					575			
aat	ctt	ctg	ttg	aag	atc	tcg	cct	tac	atc	gcc	gcc	gct	ctg	caa	ttg		1776
Asn	Leu	Leu	Leu	Lys	Ile	Ser	Pro	Tyr	Ile	Ala	Ala	Ala	Leu	Gln	Leu		
			580					585					590				
ccg	tct	gaa	aat	acc	gct	tat	tat	ata	ctc	aac	tgg	gca	gat	caa	cta		1824
Pro	Ser	Glu	Asn	Thr	Ala	Tyr	Tyr	Ile	Leu	Asn	Trp	Ala	Asp	Gln	Leu		
		595					600					605					
aaa	cct	ggc	tct	ggg	gca	atg	aca	gca	aca	aaa	ttc	tgg	gaa	tgg	ttg		1872
Lys	Pro	Gly	Ser	Gly	Ala	Met	Thr	Ala	Thr	Lys	Phe	Trp	Glu	Trp	Leu		
	610					615					620						
caa	gct	tca	cat	aat	cca	gag	caa	tca	acc	gct	ata	aca	gaa	gaa	caa		1920
Gln	Ala	Ser	His	Asn	Pro	Glu	Gln	Ser	Thr	Ala	Ile	Thr	Glu	Glu	Gln		
625					630				635						640		
gca	gtc	caa	tat	tgc	caa	tgc	ctg	gca	caa	ttg	gca	ctg	att	tat	cgt		1968
Ala	Val	Gln	Tyr	Cys	Gln	Cys	Leu	Ala	Gln	Leu	Ala	Leu	Ile	Tyr	Arg		
				645					650					655			
tcc	acc	ggc	ctt	agc	gaa	agc	act	tta	cgt	ctg	ttt	gtc	aca	aaa	cca		2016
Ser	Thr	Gly	Leu	Ser	Glu	Ser	Thr	Leu	Arg	Leu	Phe	Val	Thr	Lys	Pro		
			660					665					670				
caa	ctc	ttt	ggc	ttt	acc	gaa	gga	aca	gcg	tca	aca	cac	aat	gca	tta		2064
Gln	Leu	Phe	Gly	Phe	Thr	Glu	Gly	Thr	Ala	Ser	Thr	His	Asn	Ala	Leu		
		675					680					685					
tca	ctg	ata	aag	ctg	aca	cgt	ttt	act	gac	tgg	gtt	aac	tct	ctg	ggg		2112
Ser	Leu	Ile	Lys	Leu	Thr	Arg	Phe	Thr	Asp	Trp	Val	Asn	Ser	Leu	Gly		
	690					695					700						
gaa	aaa	gcc	tct	tct	gta	ctg	acc	gaa	ttt	gag	aag	gga	aca	tta	aca		2160
Glu	Lys	Ala	Ser	Ser	Val	Leu	Thr	Glu	Phe	Glu	Lys	Gly	Thr	Leu	Thr		
705					710					715					720		
gca	gaa	cta	ttg	gct	aac	gcc	ctg	agt	ctt	gat	aaa	aat	cta	ctg	gag		2208
Ala	Glu	Leu	Leu	Ala	Asn	Ala	Leu	Ser	Leu	Asp	Lys	Asn	Leu	Leu	Glu		
				725					730					735			
caa	gcc	agt	aat	caa	gca	caa	gtt	aat	ttc	acc	gac	tgg	ccg	tct	atc		2256
Gln	Ala	Ser	Asn	Gln	Ala	Gln	Val	Asn	Phe	Thr	Asp	Trp	Pro	Ser	Ile		
			740					745					750				
gat	acc	atc	cag	caa	tgg	att	aac	att	gcg	cgt	caa	ttg	aat	atc	tct		2304



Asp	Thr	Ile	Gln	Gln	Trp	Ile	Asn	Ile	Ala	Arg	Gln	Leu	Asn	Ile	Ser		
		755					760					765					
cca	caa	gac	gtt	tct	gca	cta	gcg	caa	gta	ctc	acc	aca	gaa	tcc	tcc	2352	
Pro	Gln	Asp	Val	Ser	Ala	Leu	Ala	Gln	Val	Leu	Thr	Thr	Glu	Ser	Ser		
		770				775				780							
gat	aac	tat	gcc	gaa	tgg	gaa	aac	gtc	gcg	gcg	aca	tta	acc	gcc	gga	2400	
Asp	Asn	Tyr	Ala	Glu	Trp	Glu	Asn	Val	Ala	Ala	Thr	Leu	Thr	Ala	Gly		
		785			790				795					800			
ctg	gac	acc	caa	aaa	gcc	aac	gcc	ctg	cac	acc	ttt	ctg	gat	gaa	tct	2448	
Leu	Asp	Thr	Gln	Lys	Ala	Asn	Ala	Leu	His	Thr	Phe	Leu	Asp	Glu	Ser		
				805					810					815			
cgt	agt	gct	gca	tta	agc	gag	tac	tat	atc	cgt	aaa	gtc	gct	aac	gca	2496	
Arg	Ser	Ala	Ala	Leu	Ser	Glu	Tyr	Tyr	Ile	Arg	Lys	Val	Ala	Asn	Ala		
			820					825					830				
ggt	gca	aaa	gtt	aaa	aac	cat	gat	gat	ctg	tac	cag	tat	tta	ttg	att	2544	
Gly	Ala	Lys	Val	Lys	Asn	His	Asp	Asp	Leu	Tyr	Gln	Tyr	Leu	Leu	Ile		
		835					840				845						
gat	aac	caa	gtt	tcc	gcc	gcc	atc	aaa	acc	acc	ccg	att	gca	gaa	gct	2592	
Asp	Asn	Gln	Val	Ser	Ala	Ala	Ile	Lys	Thr	Thr	Pro	Ile	Ala	Glu	Ala		
		850				855					860						
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Ile	Ala	Ser	Ile	Gln	Leu	Tyr	Ile	Asn	Arg	Ala	Leu	Lys	Asn	Met	Glu		
					870					875					880		
gaa	aac	gcg	gtt	tcg	cag	gtc	gtc	act	cga	cca	ttc	ttt	acc	gat	tgg	2688	
Glu	Asn	Ala	Val	Ser	Gln	Val	Val	Thr	Arg	Pro	Phe	Phe	Thr	Asp	Trp		
				885					890					895			
gac	aaa	tac	aat	aaa	cgc	tac	agc	acc	tgg	gcc	agc	att	gct	aaa	ctc	2736	
Asp	Lys	Tyr	Asn	Lys	Arg	Tyr	Ser	Thr	Trp	Ala	Ser	Ile	Ala	Lys	Leu		
			900					905					910				
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Ile	Tyr	Tyr	Pro	Glu	Asn	Tyr	Ile	Asp	Pro	Thr	Ile	Arg	Ile	Gly	Arg		
		915					920					925					
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Thr	Lys	Met	Met	Asp	Thr	Leu	Leu	Gln	Ser	Ile	Ser	Gln	Ser	Gln	Leu		
		930				935					940						
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Asn	Thr	Asp	Thr	Val	Glu	Asp	Ala	Phe	Met	Ser	Tyr	Leu	Thr	Ser	Phe		
		945			950					955				960			
gaa	cag	ata	gct	aat	ctg	gaa	gtc	gtc	agc	gcc	tat	cat	gac	aat	gcc	2928	
Glu	Gln	Ile	Ala	Asn	Leu	Glu	Val	Val	Ser	Ala	Tyr	His	Asp	Asn	Ala		
				965					970					975			
aaa	gat	gat	caa	aga	tta	acc	tat	ttt	atc	ggg	cac	agt	aaa	acc	gaa	2976	
Lys	Asp	Asp	Gln	Arg	Leu	Thr	Tyr	Phe	Ile	Gly	His	Ser	Lys	Thr	Glu		
			980					985					990				
gtt	aat	caa	tat	tac	tgg	cgt	aac	gtg	gat	cac	aat	aaa	ttc	agc	gac	3024	
Val	Asn	Gln	Tyr	Tyr	Trp	Arg	Asn	Val	Asp	His	Asn	Lys	Phe	Ser	Asp		
		995					1000					1005					
gat	aaa	ttc	cct	gcc	aat	gcc	tgg	agt	gag	tgg	cac	aaa	att	gat		3069	

Asp	Lys	Phe	Pro	Ala	Asn	Ala	Trp	Ser	Glu	Trp	His	Lys	Ile	Asp	
	1010					1015					1020				
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Cys	Pro	Ile	Asn	Pro	Tyr	Gln	Gly	Thr	Ile	His	Pro	Val	Ile	Phe	
	1025					1030					1035				
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Gln	Ser	Arg	Leu	Tyr	Leu	Ile	Trp	Leu	Glu	Gln	Lys	Lys	Ile	Ala	
	1040					1045					1050				
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Lys	Gln	Ala	Asp	Asn	Asn	Gln	Thr	Val	Glu	Asp	Tyr	Tyr	Tyr	Glu	
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Leu	Lys	Leu	Ala	His	Ile	Arg	Tyr	Asp	Gly	Thr	Trp	Asn	Thr	Pro	
	1070					1075					1080				
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Val	Ala	Phe	Asn	Ile	Asn	Asp	Lys	Val	Ser	Ala	Val	Leu	Lys	Met	
	1085					1090					1095				
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Ser	Asn	Pro	Pro	Ala	Thr	Ser	Glu	Leu	Leu	Glu	Ser	Pro	Glu	Ser	
	1100					1105					1110				
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Leu	Lys	Leu	Gly	Phe	Tyr	Cys	Thr	Asn	His	Gln	Asp	Asn	Lys	Leu	
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Leu	Val	Met	Phe	Tyr	Arg	Lys	Arg	Asp	Glu	Leu	Asp	Glu	Tyr	Lys	
	1130					1135					1140				
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Arg	Thr	Leu	Lys	Glu	Leu	Ala	Glu	Ala	Glu	Lys	Lys	Val	Lys	Glu	
	1145					1150					1155				
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Ile	Ala	Lys	Lys	Ile	Asp	Arg	Glu	Asp	Gly	Ile	Ser	Val	Ser	Asp	
	1160					1165					1170				
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	1175					1180					1185				
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Gln	Glu	Leu	Met	Gln	Gly	Val	Tyr	Ile	Ser	Ser	Asn	Met	Leu	Leu	
	1190					1195					1200				
gaa	aat	ata	gaa	tct	gaa	cag	tac	aaa	aat	att	tat	gaa	ctc	acc	3654
Glu	Asn	Ile	Glu	Ser	Glu	Gln	Tyr	Lys	Asn	Ile	Tyr	Glu	Leu	Thr	
	1205					1210					1215				
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Tyr	Ser	Lys	Phe	Asp	Ile	Asn	Asn	Ile	Ile	Lys	Val	Asn	Ser	Trp	
	1220					1225					1230				
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Asn	Pro	Val	Thr	Asp	Glu	Val	Asn	Asp	Asp	Asn	Ile	Leu	Thr	Val	
	1235					1240					1245				
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His	Asn	Asp	Thr	Asn	Gly	Ala	Gln	Tyr	Met	Gln	Ser	Gly	Gly	Tyr	
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Arg	Thr	Arg	Leu	Asn	Thr	Leu	Phe	Ala	Arg	Lys	Leu	Ile	Ser	Arg	
	1265					1270					1275				
gcc	acg	gcc	gga	ata	gat	act	att	tta	aat	ata	gag	acg	cag	aaa	3879
Ala	Thr	Ala	Gly	Ile	Asp	Thr	Ile	Leu	Asn	Ile	Glu	Thr	Gln	Lys	
	1280					1285					1290				
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Leu	Pro	Glu	Pro	Gln	Leu	Gly	Lys	Gly	Phe	Phe	Thr	Asn	Leu	Ile	
	1295					1300					1305				
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Leu	Pro	Lys	Tyr	Asp	Gln	Asn	Val	His	Gly	Ser	Glu	Arg	Trp	Phe	
	1310					1315					1320				
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Lys	Ile	His	Ile	Arg	Asn	Asp	Asn	Lys	Met	Met	Asn	Leu	Tyr	His	
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Lys	Gly	Thr	Leu	Thr	Asp	Thr	Glu	Thr	Ser	Val	Thr	Leu	Phe	Ile	
	1340					1345					1350				
cct	tgg	tct	aat	aca	caa	gaa	cgc	gtc	gaa	ata	gca	gta	gaa	tat	4104
Pro	Trp	Ser	Asn	Thr	Gln	Glu	Arg	Val	Glu	Ile	Ala	Val	Glu	Tyr	
	1355					1360					1365				
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Asn	Lys	Lys	Phe	Tyr	Lys	Asp	Gln	Gln	Asn	Trp	Glu	Thr	Ala	Leu	
	1370					1375					1380				
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Phe	His	Phe	Asn	Glu	Thr	Asn	Gln	Lys	Phe	Met	Leu	Val	Asn	Asp	
	1385					1390					1395				
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Ala	Asp	Asn	Lys	Gln	Val	Val	Ile	Asn	Asp	Thr	Asp	Ala	Ile	Val	
	1400					1405					1410				
aat	aaa	tat	aaa	ggc	ttt	ctt	gat	gtt	tcc	att	ctt	atc	gat	cag	4284
Asn	Lys	Tyr	Lys	Gly	Phe	Leu	Asp	Val	Ser	Ile	Leu	Ile	Asp	Gln	
	1415					1420					1425				
cac	acg	gaa	cca	atg	gat	ttc	agc	ggc	gct	aac	agc	ctc	tat	ttt	4329
His	Thr	Glu	Pro	Met	Asp	Phe	Ser	Gly	Ala	Asn	Ser	Leu	Tyr	Phe	
	1430					1435					1440				
tgg	gaa	cta	ttc	tac	tat	gcc	cca	atg	ctg	att	gct	cag	cgc	ctg	4374
Trp	Glu	Leu	Phe	Tyr	Tyr	Ala	Pro	Met	Leu	Ile	Ala	Gln	Arg	Leu	
	1445					1450					1455				
cta	cac	gaa	caa	cac	ttc	gat	gaa	gcc	aac	cgt	tgg	ttg	aaa	tat	4419
Leu	His	Glu	Gln	His	Phe	Asp	Glu	Ala	Asn	Arg	Trp	Leu	Lys	Tyr	
	1460					1465					1470				
atc	tgg	aat	cca	tct	ggc	tat	att	gag	cat	ggc	cag	att	cag	cac	4464
Ile	Trp	Asn	Pro	Ser	Gly	Tyr	Ile	Glu	His	Gly	Gln	Ile	Gln	His	
	1475					1480					1485				
tac	cgc	tgg	aat	gtc	cgc	cca	tta	ttg	gaa	gat	atc	agt	tgg	aac	4509

Tyr	Arg	Trp	Asn	Val	Arg	Pro	Leu	Leu	Glu	Asp	Ile	Ser	Trp	Asn	
	1490					1495					1500				
gat	gat	cca	ctg	aat	tca	gtc	gat	ccc	gat	gcc	ata	gca	caa	tat	4554
Asp	Asp	Pro	Leu	Asn	Ser	Val	Asp	Pro	Asp	Ala	Ile	Ala	Gln	Tyr	
	1505					1510					1515				
gat	cca	atg	cac	tat	aaa	gtc	gtt	act	ttt	atg	cgc	acc	ctt	gat	4599
Asp	Pro	Met	His	Tyr	Lys	Val	Val	Thr	Phe	Met	Arg	Thr	Leu	Asp	
	1520					1525					1530				
ctg	ttg	ctg	gac	cgt	gga	gat	tac	gcc	tat	cgt	cag	tta	gaa	cgg	4644
Leu	Leu	Leu	Asp	Arg	Gly	Asp	Tyr	Ala	Tyr	Arg	Gln	Leu	Glu	Arg	
	1535					1540					1545				
gac	acg	ctt	aat	gaa	gct	aag	atg	tgg	tat	atg	caa	gca	ctg	cat	4689
Asp	Thr	Leu	Asn	Glu	Ala	Lys	Met	Trp	Tyr	Met	Gln	Ala	Leu	His	
	1550					1555					1560				
ctg	tta	ggc	gat	aaa	cct	cat	cta	tct	ttc	agt	tca	acg	tgg	cgt	4734
Leu	Leu	Gly	Asp	Lys	Pro	His	Leu	Ser	Phe	Ser	Ser	Thr	Trp	Arg	
	1565					1570					1575				
aaa	ccg	agt	tta	ggc	gac	gct	gcc	aga	acg	gaa	aaa	cag	gag	gaa	4779
Lys	Pro	Ser	Leu	Gly	Asp	Ala	Ala	Arg	Thr	Glu	Lys	Gln	Glu	Glu	
	1580					1585					1590				
caa	gcc	cat	gca	atg	act	gcc	ctg	cga	caa	ggc	gat	att	agt	cgg	4824
Gln	Ala	His	Ala	Met	Thr	Ala	Leu	Arg	Gln	Gly	Asp	Ile	Ser	Arg	
	1595					1600					1605				
cac	aac	cac	ccg	aca	gat	ctt	ttc	ttg	cca	cag	gtc	aat	gaa	gtg	4869
His	Asn	His	Pro	Thr	Asp	Leu	Phe	Leu	Pro	Gln	Val	Asn	Glu	Val	
	1610					1615					1620				
atg	caa	aac	tac	tgg	cag	aaa	ctg	gag	caa	cgg	ctg	tac	aac	ctg	4914
Met	Gln	Asn	Tyr	Trp	Gln	Lys	Leu	Glu	Gln	Arg	Leu	Tyr	Asn	Leu	
	1625					1630					1635				
cgc	cat	aat	ctc	tct	atc	gac	ggc	caa	ctg	cta	cat	ctg	cct	att	4959
Arg	His	Asn	Leu	Ser	Ile	Asp	Gly	Gln	Leu	Leu	His	Leu	Pro	Ile	
	1640					1645					1650				
tac	gct	aca	ccg	gca	gat	cca	aaa	gcg	tta	ctc	agt	gcc	gct	gtt	5004
Tyr	Ala	Thr	Pro	Ala	Asp	Pro	Lys	Ala	Leu	Leu	Ser	Ala	Ala	Val	
	1655					1660					1665				
gcc	aac	tca	caa	ggc	gga	agc	aag	tta	cca	atg	tca	ttt	atg	tca	5049
Ala	Asn	Ser	Gln	Gly	Gly	Ser	Lys	Leu	Pro	Met	Ser	Phe	Met	Ser	
	1670					1675					1680				
ctg	tgg	cgt	ttc	cca	cag	atg	ttg	gaa	aac	gcg	cgc	ggc	atg	gta	5094
Leu	Trp	Arg	Phe	Pro	Gln	Met	Leu	Glu	Asn	Ala	Arg	Gly	Met	Val	
	1685					1690					1695				
agc	cag	tta	aca	cag	ttc	ggc	tcc	acg	tta	caa	aat	att	atc	gaa	5139
Ser	Gln	Leu	Thr	Gln	Phe	Gly	Ser	Thr	Leu	Gln	Asn	Ile	Ile	Glu	
	1700					1705					1710				
cgt	cag	gat	gcg	gaa	gcc	tta	aac	acg	cta	ttg	cag	aat	caa	gcg	5184
Arg	Gln	Asp	Ala	Glu	Ala	Leu	Asn	Thr	Leu	Leu	Gln	Asn	Gln	Ala	
	1715					1720					1725				
gca	gaa	ctg	ata	ttg	act	aat	ctc	agc	ata	cag	gac	aaa	acc	ctg	5229

Ala	Glu	Leu	Ile	Leu	Thr	Asn	Leu	Ser	Ile	Gln	Asp	Lys	Thr	Leu	
	1730					1735					1740				
gaa	gag	ctg	gat	gcg	gaa	aaa	atc	gta	ctg	gag	aaa	tcc	aaa	gct	5274
Glu	Glu	Leu	Asp	Ala	Glu	Lys	Ile	Val	Leu	Glu	Lys	Ser	Lys	Ala	
	1745					1750					1755				
gga	gcg	caa	tca	cgc	ttt	aac	agc	tac	aaa	aag	cta	tac	gat	gaa	5319
Gly	Ala	Gln	Ser	Arg	Phe	Asn	Ser	Tyr	Lys	Lys	Leu	Tyr	Asp	Glu	
	1760					1765					1770				
aat	atc	aat	gcg	ggt	gaa	aac	cgg	gta	ata	gca	ttg	cat	tcc	tcc	5364
Asn	Ile	Asn	Ala	Gly	Glu	Asn	Arg	Val	Ile	Ala	Leu	His	Ser	Ser	
	1775					1780					1785				
gtt	gct	ggc	ctt	agc	act	gcc	ctg	caa	gca	tcg	cgt	ctg	gca	ggc	5409
Val	Ala	Gly	Leu	Ser	Thr	Ala	Leu	Gln	Ala	Ser	Arg	Leu	Ala	Gly	
	1790					1795					1800				
gcc	gcc	ctt	gat	ctg	gcg	ccc	aac	att	ttc	ggc	ttc	gct	gat	ggc	5454
Ala	Ala	Leu	Asp	Leu	Ala	Pro	Asn	Ile	Phe	Gly	Phe	Ala	Asp	Gly	
	1805					1810					1815				
ggc	agc	cgt	tgg	ggg	gca	att	gcc	gaa	gcg	aca	ggt	aat	gtc	atg	5499
Gly	Ser	Arg	Trp	Gly	Ala	Ile	Ala	Glu	Ala	Thr	Gly	Asn	Val	Met	
	1820					1825					1830				
gaa	ttc	tcc	gca	aat	gtt	atg	aac	acc	gaa	gcg	gat	aaa	atc	agc	5544
Glu	Phe	Ser	Ala	Asn	Val	Met	Asn	Thr	Glu	Ala	Asp	Lys	Ile	Ser	
	1835					1840					1845				
cag	tct	gaa	acc	tat	cgc	cgt	cgc	cgt	cag	gag	tgg	gaa	atc	caa	5589
Gln	Ser	Glu	Thr	Tyr	Arg	Arg	Arg	Arg	Gln	Glu	Trp	Glu	Ile	Gln	
	1850					1855					1860				
cgt	aac	aat	gcc	gaa	gca	gag	ata	aaa	caa	atc	gat	gcc	caa	ctt	5634
Arg	Asn	Asn	Ala	Glu	Ala	Glu	Ile	Lys	Gln	Ile	Asp	Ala	Gln	Leu	
	1865					1870					1875				
caa	tcg	ttg	gca	gta	cgc	cgt	gaa	gct	gcg	gtg	ttg	cag	aaa	acc	5679
Gln	Ser	Leu	Ala	Val	Arg	Arg	Glu	Ala	Ala	Val	Leu	Gln	Lys	Thr	
	1880					1885					1890				
agc	ctg	aaa	acc	caa	cag	gaa	cag	act	cag	gcg	caa	ttg	act	ttc	5724
Ser	Leu	Lys	Thr	Gln	Gln	Glu	Gln	Thr	Gln	Ala	Gln	Leu	Thr	Phe	
	1895					1900					1905				
cta	caa	cgt	aaa	ttc	agt	aat	caa	gcg	ttg	tac	cac	tgg	cta	cgt	5769
Leu	Gln	Arg	Lys	Phe	Ser	Asn	Gln	Ala	Leu	Tyr	His	Trp	Leu	Arg	
	1910					1915					1920				
ggt	cgg	cta	gct	gct	atc	tac	ttc	caa	ttt	tac	gat	ttg	gcc	gta	5814
Gly	Arg	Leu	Ala	Ala	Ile	Tyr	Phe	Gln	Phe	Tyr	Asp	Leu	Ala	Val	
	1925					1930					1935				
acc	cgt	tgt	ctg	atg	gca	gaa	atg	gct	tat	cgt	tgg	gag	act	cat	5859
Thr	Arg	Cys	Leu	Met	Ala	Glu	Met	Ala	Tyr	Arg	Trp	Glu	Thr	His	
	1940					1945					1950				
aat	acc	aca	gca	agc	ttt	atc	aaa	ccc	ggc	gcc	tgg	cag	ggg	acg	5904
Asn	Thr	Thr	Ala	Ser	Phe	Ile	Lys	Pro	Gly	Ala	Trp	Gln	Gly	Thr	
	1955					1960					1965				
cac	gct	ggt	ctg	ctc	gcc	ggt	gaa	acc	ttg	atg	ctg	aat	ctg	gca	5949

His	Ala	Gly	Leu	Leu	Ala	Gly	Glu	Thr	Leu	Met	Leu	Asn	Leu	Ala	
	1970					1975					1980				
caa	atg	gag	gat	gct	tat	ttg	aga	tgg	gat	caa	cgc	gct	ctg	gaa	5994
Gln	Met	Glu	Asp	Ala	Tyr	Leu	Arg	Trp	Asp	Gln	Arg	Ala	Leu	Glu	
	1985					1990					1995				
gtg	gaa	cgt	act	att	tca	ctg	gcg	caa	ctc	tat	gga	aca	cta	cca	6039
Val	Glu	Arg	Thr	Ile	Ser	Leu	Ala	Gln	Leu	Tyr	Gly	Thr	Leu	Pro	
	2000					2005					2010				
gaa	aaa	tca	ttt	aat	ttg	gca	aca	cgt	att	tct	gcc	cta	cta	aca	6084
Glu	Lys	Ser	Phe	Asn	Leu	Ala	Thr	Arg	Ile	Ser	Ala	Leu	Leu	Thr	
	2015					2020					2025				
ggt	agt	aca	act	gaa	ccc	gtt	gag	gag	cat	ccc	gtt	aca	tta	gaa	6129
Gly	Ser	Thr	Thr	Glu	Pro	Val	Glu	Glu	His	Pro	Val	Thr	Leu	Glu	
	2030					2035					2040				
aac	ggt	caa	cta	agc	gcc	aaa	atc	tct	ctg	tca	ggt	ctg	tca	cta	6174
Asn	Gly	Gln	Leu	Ser	Ala	Lys	Ile	Ser	Leu	Ser	Gly	Leu	Ser	Leu	
	2045					2050					2055				
cat	aat	gac	tac	cca	gaa	ggc	aat	ggc	gta	ggc	aac	att	cgg	cgc	6219
His	Asn	Asp	Tyr	Pro	Glu	Gly	Asn	Gly	Val	Gly	Asn	Ile	Arg	Arg	
	2060					2065					2070				
att	aaa	cag	atc	agt	gtc	acc	ctg	cca	gct	ctg	tta	ggg	cca	tac	6264
Ile	Lys	Gln	Ile	Ser	Val	Thr	Leu	Pro	Ala	Leu	Leu	Gly	Pro	Tyr	
	2075					2080					2085				
caa	aat	gta	caa	gcc	att	ttg	gcc	tac	gag	gga	agt	gaa	atc	gga	6309
Gln	Asn	Val	Gln	Ala	Ile	Leu	Ala	Tyr	Glu	Gly	Ser	Glu	Ile	Gly	
	2090					2095					2100				
tta	gct	gag	agc	tgt	aaa	tca	ctg	gca	att	tct	cat	ggg	gtt	aat	6354
Leu	Ala	Glu	Ser	Cys	Lys	Ser	Leu	Ala	Ile	Ser	His	Gly	Val	Asn	
	2105					2110					2115				
gac	agt	ggg	caa	ttc	cag	ttg	gat	ttc	aac	aat	ggt	aaa	ttc	ctg	6399
Asp	Ser	Gly	Gln	Phe	Gln	Leu	Asp	Phe	Asn	Asn	Gly	Lys	Phe	Leu	
	2120					2125					2130				
ccg	ttt	gaa	ggg	ata	gcg	att	aac	gat	acc	ggc	aca	tta	aca	ctc	6444
Pro	Phe	Glu	Gly	Ile	Ala	Ile	Asn	Asp	Thr	Gly	Thr	Leu	Thr	Leu	
	2135					2140					2145				
aat	ttc	ccg	aat	gcg	acc	ggc	aaa	cag	caa	gcc	atg	tta	caa	gca	6489
Asn	Phe	Pro	Asn	Ala	Thr	Gly	Lys	Gln	Gln	Ala	Met	Leu	Gln	Ala	
	2150					2155					2160				
ttg	agc	gat	att	att	ctg	cat	att	cgc	tac	acc	atc	cgc	caa	taa	6534
Leu	Ser	Asp	Ile	Ile	Leu	His	Ile	Arg	Tyr	Thr	Ile	Arg	Gln		
	2165					2170					2175				

&lt;210&gt; 6

&lt;211&gt; 2177

&lt;212&gt; PRT

&lt;213&gt; Photorhabdus luminescens

&lt;400&gt; 6

Met	Ser	Thr	Ile	Thr	Pro	Glu	His	Pro	Glu	Met	Ala	Gln	Gln	Ala	Gln		
1				5					10					15			
Lys	Ala	Asn	Arg	Leu	His	Glu	Ala	Ser	Ile	Leu	Lys	Arg	Ala	Asn	Pro		
		20						25					30				
Gln	Leu	Gln	Asn	Ala	Val	His	Leu	Ala	Leu	Thr	Thr	Pro	His	Ala	Asp		
		35					40					45					
Gln	Gln	Gly	Tyr	Asn	Ser	Lys	Phe	Gly	Gly	Arg	Ala	Ser	Gln	Tyr	Val		
	50					55					60						
Ala	Pro	Gly	Ala	Val	Ala	Ser	Met	Phe	Ser	Pro	Ala	Ala	Tyr	Leu	Thr		
65					70					75					80		
Glu	Leu	Tyr	Arg	Gln	Ala	Gln	Asp	Leu	His	Lys	Lys	Glu	Ser	Ile	Tyr		
				85					90					95			
His	Leu	Asp	Lys	Arg	Arg	Pro	Asp	Leu	Lys	Ser	Leu	Thr	Leu	Ser	Gln		
			100					105					110				
Gln	Asn	Met	Asp	Asp	Glu	Val	Ser	Thr	Leu	Ser	Leu	Ser	Asn	Lys	Val		
		115					120					125					
Leu	Leu	Glu	Gly	Ile	Lys	Thr	Leu	Thr	Gly	Leu	Glu	Gly	His	Thr	Asn		
	130					135					140						
Val	Met	Lys	Ala	Leu	Ser	Thr	Phe	Arg	Ser	Ser	Gly	Ser	Leu	Pro	Tyr		
145					150					155					160		
His	Asp	Ala	Tyr	Glu	Ser	Val	Arg	Lys	Val	Ile	Gln	Leu	Gln	Ala	Pro		
				165					170					175			
Ile	Phe	Asp	Gln	Val	Gly	Pro	Ser	Pro	Glu	Thr	Asp	Ile	Ala	Asn	Leu		
			180					185					190				
Thr	Tyr	Gln	Ala	Ser	Leu	Leu	Gly	Ile	Asn	Ala	Ser	Val	Leu	Pro	Glu		
		195					200					205					
Leu	Phe	Lys	Thr	Leu	Thr	Glu	Glu	Ile	Thr	Glu	Val	Asn	Ala	Asn	Glu		
	210					215					220						
Lys	Phe	Lys	Lys	Asn	Phe	Gly	Asp	Arg	Glu	Pro	Ser	Glu	Leu	Leu	Thr		
225				230						235					240		
Leu	Asp	Ala	Leu	Lys	His	Tyr	Tyr	Asn	Leu	Thr	Asn	Glu	Glu	Leu	Glu		
				245					250					255			
Gln	Phe	Leu	Asn	His	Val	Leu	Ile	Glu	Ser	Asn	Ser	Thr	Tyr	Thr	Asn		
			260					265					270				
Asn	Gln	Leu	Ile	Asn	Ile	Ser	Ile	Asp	Thr	Ser	Gly	Lys	Ile	Gln	Leu		
		275					280					285					
Ser	Arg	Ile	Thr	Arg	Thr	Pro	Asp	Leu	Asn	Tyr	Asn	Asn	Leu	Asn	Tyr		
	290					295					300						
Met	Asn	Leu	Tyr	Pro	Ile	Gln	Asn	Arg	Arg	Phe	Tyr	Val	Asp	Ile	Ser		
305					310					315					320		
Tyr	Lys	Lys	Lys	Ala	Gly	Gln	Val	Ser	Ile	Arg	Leu	Ser	Lys	Pro	Gln		
				325					330					335			

Ser Lys Tyr Leu Lys Gly Ile Tyr Lys Ala Thr Ile Glu Asn Thr Asn  
 340 345 350  
 Tyr Ser Ser Pro Thr Phe Glu Leu Thr Asp Lys Asp Ile Gln Lys Glu  
 355 360 365  
 Phe Thr Leu Leu Ser Tyr Arg Tyr Lys Glu Asn Ser Asp Ser Asn Ile  
 370 375 380  
 Ser Asp Ser Ser Tyr Ala Lys Phe Lys Ile Gln Asp Tyr Ser Pro Ala  
 385 390 395 400  
 Ile Phe Leu Leu Lys Leu Asn Lys Thr Ile Arg Leu Ser His Ala Thr  
 405 410 415  
 Lys Leu Leu Pro Thr Val Leu Glu Lys Ile Val Phe Asn Ile Asn Gln  
 420 425 430  
 Lys Leu Asp Ile Asn Ala Glu Ile Leu Lys Lys Ile Phe Arg Val Lys  
 435 440 445  
 Tyr Tyr Met Gln Arg Tyr Gly Ile Asp Ala Glu Thr Ala Leu Val Leu  
 450 455 460  
 Cys Lys Val Ser Thr Asn Ile Ile Asn Pro Ser Ser Ser Asp Leu Ile  
 465 470 475 480  
 Lys Leu Leu Ala Asn Ile His Gln Leu Thr Val Asn Glu Leu Asn Leu  
 485 490 495  
 Leu Leu Val Ala Ile Gly Glu Gly Ser Thr Asn Leu Ser Glu Leu Ser  
 500 505 510  
 Asp Asn Asn Leu Ser Val Leu Ile Asp Lys Leu Tyr Ser Ile Thr Gln  
 515 520 525  
 Trp Leu Arg Thr Arg Lys Trp Asn Met Tyr Leu Leu Phe Met Met Thr  
 530 535 540  
 Thr Thr Asp Tyr Asn Gln Thr Leu Thr Pro Glu Ile Gln Asn Leu Leu  
 545 550 555 560  
 Asp Ala Val Tyr Asn Gly Leu Gln Asn Phe Asn Ser Lys Asn Glu Ala  
 565 570 575  
 Asn Leu Leu Leu Lys Ile Ser Pro Tyr Ile Ala Ala Ala Leu Gln Leu  
 580 585 590  
 Pro Ser Glu Asn Thr Ala Tyr Tyr Ile Leu Asn Trp Ala Asp Gln Leu  
 595 600 605  
 Lys Pro Gly Ser Gly Ala Met Thr Ala Thr Lys Phe Trp Glu Trp Leu  
 610 615 620  
 Gln Ala Ser His Asn Pro Glu Gln Ser Thr Ala Ile Thr Glu Glu Gln  
 625 630 635 640  
 Ala Val Gln Tyr Cys Gln Cys Leu Ala Gln Leu Ala Leu Ile Tyr Arg  
 645 650 655  
 Ser Thr Gly Leu Ser Glu Ser Thr Leu Arg Leu Phe Val Thr Lys Pro  
 660 665 670  
 Gln Leu Phe Gly Phe Thr Glu Gly Thr Ala Ser Thr His Asn Ala Leu



675					680					685					
Ser	Leu	Ile	Lys	Leu	Thr	Arg	Phe	Thr	Asp	Trp	Val	Asn	Ser	Leu	Gly
690						695					700				
Glu	Lys	Ala	Ser	Ser	Val	Leu	Thr	Glu	Phe	Glu	Lys	Gly	Thr	Leu	Thr
705					710					715					720
Ala	Glu	Leu	Leu	Ala	Asn	Ala	Leu	Ser	Leu	Asp	Lys	Asn	Leu	Leu	Glu
				725					730					735	
Gln	Ala	Ser	Asn	Gln	Ala	Gln	Val	Asn	Phe	Thr	Asp	Trp	Pro	Ser	Ile
			740					745					750		
Asp	Thr	Ile	Gln	Gln	Trp	Ile	Asn	Ile	Ala	Arg	Gln	Leu	Asn	Ile	Ser
		755					760					765			
Pro	Gln	Asp	Val	Ser	Ala	Leu	Ala	Gln	Val	Leu	Thr	Thr	Glu	Ser	Ser
	770					775					780				
Asp	Asn	Tyr	Ala	Glu	Trp	Glu	Asn	Val	Ala	Ala	Thr	Leu	Thr	Ala	Gly
785					790					795					800
Leu	Asp	Thr	Gln	Lys	Ala	Asn	Ala	Leu	His	Thr	Phe	Leu	Asp	Glu	Ser
				805					810					815	
Arg	Ser	Ala	Ala	Leu	Ser	Glu	Tyr	Tyr	Ile	Arg	Lys	Val	Ala	Asn	Ala
			820					825					830		
Gly	Ala	Lys	Val	Lys	Asn	His	Asp	Asp	Leu	Tyr	Gln	Tyr	Leu	Leu	Ile
		835					840					845			
Asp	Asn	Gln	Val	Ser	Ala	Ala	Ile	Lys	Thr	Thr	Pro	Ile	Ala	Glu	Ala
	850					855					860				
Ile	Ala	Ser	Ile	Gln	Leu	Tyr	Ile	Asn	Arg	Ala	Leu	Lys	Asn	Met	Glu
865					870					875					880
Glu	Asn	Ala	Val	Ser	Gln	Val	Val	Thr	Arg	Pro	Phe	Phe	Thr	Asp	Trp
				885					890					895	
Asp	Lys	Tyr	Asn	Lys	Arg	Tyr	Ser	Thr	Trp	Ala	Ser	Ile	Ala	Lys	Leu
			900					905					910		
Ile	Tyr	Tyr	Pro	Glu	Asn	Tyr	Ile	Asp	Pro	Thr	Ile	Arg	Ile	Gly	Arg
		915					920					925			
Thr	Lys	Met	Met	Asp	Thr	Leu	Leu	Gln	Ser	Ile	Ser	Gln	Ser	Gln	Leu
	930					935					940				
Asn	Thr	Asp	Thr	Val	Glu	Asp	Ala	Phe	Met	Ser	Tyr	Leu	Thr	Ser	Phe
945					950					955					960
Glu	Gln	Ile	Ala	Asn	Leu	Glu	Val	Val	Ser	Ala	Tyr	His	Asp	Asn	Ala
				965					970					975	
Lys	Asp	Asp	Gln	Arg	Leu	Thr	Tyr	Phe	Ile	Gly	His	Ser	Lys	Thr	Glu
			980					985					990		
Val	Asn	Gln	Tyr	Tyr	Trp	Arg	Asn	Val	Asp	His	Asn	Lys	Phe	Ser	Asp
		995					1000					1005			
Asp	Lys	Phe	Pro	Ala	Asn	Ala	Trp	Ser	Glu	Trp	His	Lys	Ile	Asp	
	1010					1015					1020				

Cys	Pro	Ile	Asn	Pro	Tyr	Gln	Gly	Thr	Ile	His	Pro	Val	Ile	Phe
1025						1030					1035			
Gln	Ser	Arg	Leu	Tyr	Leu	Ile	Trp	Leu	Glu	Gln	Lys	Lys	Ile	Ala
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Lys	Gln	Ala	Asp	Asn	Asn	Gln	Thr	Val	Glu	Asp	Tyr	Tyr	Tyr	Glu
1055						1060					1065			
Leu	Lys	Leu	Ala	His	Ile	Arg	Tyr	Asp	Gly	Thr	Trp	Asn	Thr	Pro
1070						1075					1080			
Val	Ala	Phe	Asn	Ile	Asn	Asp	Lys	Val	Ser	Ala	Val	Leu	Lys	Met
1085						1090					1095			
Ser	Asn	Pro	Pro	Ala	Thr	Ser	Glu	Leu	Leu	Glu	Ser	Pro	Glu	Ser
1100						1105					1110			
Leu	Lys	Leu	Gly	Phe	Tyr	Cys	Thr	Asn	His	Gln	Asp	Asn	Lys	Leu
1115						1120					1125			
Leu	Val	Met	Phe	Tyr	Arg	Lys	Arg	Asp	Glu	Leu	Asp	Glu	Tyr	Lys
1130						1135					1140			
Arg	Thr	Leu	Lys	Glu	Leu	Ala	Glu	Ala	Glu	Lys	Lys	Val	Lys	Glu
1145						1150					1155			
Ile	Ala	Lys	Lys	Ile	Asp	Arg	Glu	Asp	Gly	Ile	Ser	Val	Ser	Asp
1160						1165					1170			
His	Gln	Glu	Lys	Gln	Thr	Ala	Glu	Lys	Lys	Leu	Lys	Glu	Leu	Ile
1175						1180					1185			
Gln	Glu	Leu	Met	Gln	Gly	Val	Tyr	Ile	Ser	Ser	Asn	Met	Leu	Leu
1190						1195					1200			
Glu	Asn	Ile	Glu	Ser	Glu	Gln	Tyr	Lys	Asn	Ile	Tyr	Glu	Leu	Thr
1205						1210					1215			
Tyr	Ser	Lys	Phe	Asp	Ile	Asn	Asn	Ile	Ile	Lys	Val	Asn	Ser	Trp
1220						1225					1230			
Asn	Pro	Val	Thr	Asp	Glu	Val	Asn	Asp	Asp	Asn	Ile	Leu	Thr	Val
1235						1240					1245			
His	Asn	Asp	Thr	Asn	Gly	Ala	Gln	Tyr	Met	Gln	Ser	Gly	Gly	Tyr
1250						1255					1260			
Arg	Thr	Arg	Leu	Asn	Thr	Leu	Phe	Ala	Arg	Lys	Leu	Ile	Ser	Arg
1265						1270					1275			
Ala	Thr	Ala	Gly	Ile	Asp	Thr	Ile	Leu	Asn	Ile	Glu	Thr	Gln	Lys
1280						1285					1290			
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1295						1300					1305			
Leu	Pro	Lys	Tyr	Asp	Gln	Asn	Val	His	Gly	Ser	Glu	Arg	Trp	Phe
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Lys	Gly	Thr	Leu	Thr	Asp	Thr	Glu	Thr	Ser	Val	Thr	Leu	Phe	Ile
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Pro	Trp	Ser	Asn	Thr	Gln	Glu	Arg	Val	Glu	Ile	Ala	Val	Glu	Tyr
	1355					1360					1365			
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	1370					1375					1380			
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	1415					1420					1425			
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	1430					1435					1440			
Trp	Glu	Leu	Phe	Tyr	Tyr	Ala	Pro	Met	Leu	Ile	Ala	Gln	Arg	Leu
	1445					1450					1455			
Leu	His	Glu	Gln	His	Phe	Asp	Glu	Ala	Asn	Arg	Trp	Leu	Lys	Tyr
	1460					1465					1470			
Ile	Trp	Asn	Pro	Ser	Gly	Tyr	Ile	Glu	His	Gly	Gln	Ile	Gln	His
	1475					1480					1485			
Tyr	Arg	Trp	Asn	Val	Arg	Pro	Leu	Leu	Glu	Asp	Ile	Ser	Trp	Asn
	1490					1495					1500			
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	1505					1510					1515			
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1715						1720					1725			
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Glu	Glu	Leu	Asp	Ala	Glu	Lys	Ile	Val	Leu	Glu	Lys	Ser	Lys	Ala
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1790						1795					1800			
Ala	Ala	Leu	Asp	Leu	Ala	Pro	Asn	Ile	Phe	Gly	Phe	Ala	Asp	Gly
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1895						1900					1905			
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1925						1930					1935			
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Gln Met Glu Asp Ala Tyr Leu Arg Trp Asp Gln Arg Ala Leu Glu  
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 2015 2020 2025  
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 Asp Ser Gly Gln Phe Gln Leu Asp Phe Asn Asn Gly Lys Phe Leu  
 2120 2125 2130  
 Pro Phe Glu Gly Ile Ala Ile Asn Asp Thr Gly Thr Leu Thr Leu  
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&lt;211&gt; 7146

&lt;212&gt; DNA

&lt;213&gt; Photorhabdus luminescens

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1)..(7143)

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ggt att aat tgt ctg aca gat att tgc cac tat tct ttt aat gaa ttt	96
Gly Ile Asn Cys Leu Thr Asp Ile Cys His Tyr Ser Phe Asn Glu Phe	
20 25 30	
cgt cag caa gtc tct gat cat ctc tcc tgg tca gag acc aac cgc tta	144

Arg	Gln	Gln	Val	Ser	Asp	His	Leu	Ser	Trp	Ser	Glu	Thr	Asn	Arg	Leu	
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Tyr	Arg	Asp	Ala	Gln	Gln	Glu	Gln	Lys	Glu	Asn	Gln	Leu	Tyr	Glu	Ala	
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cgt	att	ctt	aaa	cgc	gct	aac	ccg	cag	ttg	caa	aat	gca	gtg	cac	ctc	240
Arg	Ile	Leu	Lys	Arg	Ala	Asn	Pro	Gln	Leu	Gln	Asn	Ala	Val	His	Leu	
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Gln	Ser	Asn	Leu	Asp	Ser	Asp	Thr	Lys	Val	Met	Glu	Met	Leu	Ser	Thr	
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Phe	Arg	Pro	Ser	Gly	Thr	Ile	Pro	Tyr	His	Asp	Ala	Tyr	Glu	Asn	Val	
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Arg	Lys	Ala	Ile	Gln	Leu	Gln	Asp	Pro	Lys	Leu	Glu	Gln	Phe	Gln	Lys	
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Ser	Pro	Ala	Val	Ala	Gly	Leu	Met	His	Gln	Ala	Ser	Leu	Leu	Gly	Ile	
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Asn	Asn	Ser	Ile	Ser	Pro	Glu	Leu	Phe	Asn	Ile	Leu	Thr	Glu	Glu	Ile	
				245					250					255		
acc	gaa	gct	aac	gca	gag	gca	att	tat	aaa	cag	aat	ttt	ggc	gat	att	816
Thr	Glu	Ala	Asn	Ala	Glu	Ala	Ile	Tyr	Lys	Gln	Asn	Phe	Gly	Asp	Ile	
			260					265					270			
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Asp	Pro	Ala	Cys	Leu	Ala	Met	Pro	Glu	Tyr	Leu	Lys	Ser	Tyr	Tyr	Asn	
		275					280					285				
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Phe 290	Ser	Asp	Glu	Glu	Leu	Ser 295	Gln	Phe	Ile	Arg	Lys 300	Tyr	Pro	Asp	Asn	
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gcc	caa	tgg	gaa	aat	gca	gct	ata	gca	tta	act	gcc	ggg	tta	gac	act	2400
Ala	Gln	Trp	Glu	Asn	Ala 790	Ala	Ile	Ala	Leu	Thr 795	Ala	Gly	Leu	Asp	Thr 800	
caa	caa	act	cat	act	cta	cac	gta	ttt	ctg	gac	gaa	tct	cgc	agt	acc	2448



Gln Gln Thr His Thr Leu His Val Phe Leu Asp Glu Ser Arg Ser Thr	
805 810 815	
gca tta agc aac tat tat att ggc aag gtt gct aat cgg gca gca tca	2496
Ala Leu Ser Asn Tyr Tyr Ile Gly Lys Val Ala Asn Arg Ala Ala Ser	
820 825 830	
att aaa agc cgt gac gat tta tac caa tac tta ctg att gat aat caa	2544
Ile Lys Ser Arg Asp Asp Leu Tyr Gln Tyr Leu Leu Ile Asp Asn Gln	
835 840 845	
gtt tcc gct gaa ata aaa act aca cgt att gcc gaa gcc att gcc agt	2592
Val Ser Ala Glu Ile Lys Thr Thr Arg Ile Ala Glu Ala Ile Ala Ser	
850 855 860	
atc caa ttg tat gtc aac cga gcg ctg gaa aat ata gaa atc cat gcc	2640
Ile Gln Leu Tyr Val Asn Arg Ala Leu Glu Asn Ile Glu Ile His Ala	
865 870 875 880	
gtt tct gat gtt att acc cgt caa ttt ttt atc gat tgg gat aaa tat	2688
Val Ser Asp Val Ile Thr Arg Gln Phe Phe Ile Asp Trp Asp Lys Tyr	
885 890 895	
aat aaa cgt tac agt act tgg gct ggc gtt tca caa tta gtt tac tat	2736
Asn Lys Arg Tyr Ser Thr Trp Ala Gly Val Ser Gln Leu Val Tyr Tyr	
900 905 910	
ccc gaa aat tat atc gac ccg acg atg cgt atc gga caa acg aaa atg	2784
Pro Glu Asn Tyr Ile Asp Pro Thr Met Arg Ile Gly Gln Thr Lys Met	
915 920 925	
atg gat acg tta ttg caa tcc gtc agc cag agc caa tta aat gcc gat	2832
Met Asp Thr Leu Leu Gln Ser Val Ser Gln Ser Gln Leu Asn Ala Asp	
930 935 940	
acg gta gaa gat gca ttt aaa tct tac ctg acc tcg ttt gaa caa gtc	2880
Thr Val Glu Asp Ala Phe Lys Ser Tyr Leu Thr Ser Phe Glu Gln Val	
945 950 955 960	
gct aat ttg gaa gtc att agt gct tat cat gat aac gtt aat aat gac	2928
Ala Asn Leu Glu Val Ile Ser Ala Tyr His Asp Asn Val Asn Asn Asp	
965 970 975	
caa gga ctg acc tat ttt atc ggg aac agc aaa aca gaa gtt aat caa	2976
Gln Gly Leu Thr Tyr Phe Ile Gly Asn Ser Lys Thr Glu Val Asn Gln	
980 985 990	
tat tac tgg cgc agc gtc gat cac agt aaa ttc aac gac ggt aaa ttc	3024
Tyr Tyr Trp Arg Ser Val Asp His Ser Lys Phe Asn Asp Gly Lys Phe	
995 1000 1005	
gct gct aat gcc tgg agt gaa tgg cac aaa att gac tgc gca att	3069
Ala Ala Asn Ala Trp Ser Glu Trp His Lys Ile Asp Cys Ala Ile	
1010 1015 1020	
aat ccc tac caa agc acc att cgc cca gtt atc tat aaa tcc cga	3114
Asn Pro Tyr Gln Ser Thr Ile Arg Pro Val Ile Tyr Lys Ser Arg	
1025 1030 1035	
tta tat ctg att tgg ctg gaa caa aaa gaa aca gct aaa caa aag	3159
Leu Tyr Leu Ile Trp Leu Glu Gln Lys Glu Thr Ala Lys Gln Lys	
1040 1045 1050	
gag gat aat aaa gtc act aca gac tat cac tat gaa tta aaa ttg	3204

Glu	Asp	Asn	Lys	Val	Thr	Thr	Asp	Tyr	His	Tyr	Glu	Leu	Lys	Leu	
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Ala	His	Ile	Arg	Tyr	Asp	Gly	Thr	Trp	Asn	Val	Pro	Ile	Thr	Phe	
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Asp	Val	Asp	Glu	Lys	Ile	Leu	Ala	Leu	Glu	Leu	Thr	Lys	Ser	Gln	
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Ala	Pro	Gly	Leu	Tyr	Cys	Ala	Gly	Tyr	Gln	Gly	Glu	Asp	Thr	Leu	
	1100					1105					1110				
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Leu	Ile	Met	Phe	Tyr	Arg	Lys	Lys	Glu	Lys	Leu	Asp	Asp	Tyr	Lys	
	1115					1120					1125				
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Thr	Ala	Pro	Met	Gln	Gly	Phe	Tyr	Ile	Phe	Ser	Asp	Met	Ser	Ser	
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Lys	Asp	Met	Thr	Asn	Glu	Gln	Cys	Asn	Ser	Tyr	Arg	Asp	Asn	Gly	
	1145					1150					1155				
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Tyr	Thr	His	Phe	Asp	Thr	Asn	Ser	Asp	Thr	Asn	Ser	Val	Ile	Arg	
	1160					1165					1170				
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Ile	Asn	Asn	Arg	Tyr	Ala	Glu	Asp	Tyr	Glu	Ile	Pro	Ser	Leu	Ile	
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Asn	His	Ser	Asn	Ser	His	Asp	Trp	Gly	Glu	Tyr	Asn	Leu	Ser	Gln	
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Val	Tyr	Gly	Gly	Asn	Ile	Val	Ile	Asn	Tyr	Lys	Val	Thr	Ser	Asn	
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Asp	Leu	Lys	Ile	Tyr	Ile	Ser	Pro	Lys	Leu	Arg	Ile	Ile	His	Asp	
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Gly	Lys	Glu	Gly	Arg	Glu	Arg	Ile	Gln	Ser	Asn	Leu	Ile	Lys	Lys	
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Tyr	Gly	Lys	Leu	Gly	Asp	Lys	Phe	Ile	Ile	Tyr	Thr	Ser	Leu	Gly	
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Ile	Asn	Pro	Asn	Asn	Ser	Ser	Asn	Arg	Phe	Met	Phe	Tyr	Pro	Val	
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Tyr	Gln	Tyr	Asn	Gly	Asn	Thr	Ser	Gly	Leu	Ala	Gln	Gly	Arg	Leu	
	1280					1285					1290				
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Leu	Phe	His	Arg	Asp	Thr	Ser	Tyr	Ser	Ser	Lys	Val	Ala	Ala	Trp	
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Ile	Pro	Gly	Ala	Gly	Arg	Ser	Leu	Ile	Asn	Glu	Asn	Ala	Asn	Ile	
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Gly	Asp	Asp	Cys	Ala	Glu	Asp	Ser	Val	Asn	Lys	Pro	Asp	Asp	Leu	
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Lys	Gln	Tyr	Ile	Tyr	Met	Thr	Asp	Ser	Lys	Gly	Thr	Ala	Thr	Asp	
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Val	Ser	Gly	Pro	Val	Asp	Ile	Asn	Thr	Ala	Ile	Ser	Ser	Glu	Lys	
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Val	Gln	Ile	Thr	Ile	Lys	Ala	Gly	Lys	Glu	Tyr	Ser	Leu	Thr	Ala	
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Asn	Lys	Asp	Val	Ser	Val	Gln	Pro	Ser	Pro	Ser	Phe	Glu	Glu	Met	
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Cys	Tyr	Gln	Phe	Asn	Ala	Leu	Glu	Ile	Asp	Gly	Ser	Asn	Leu	Asn	
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Phe	Thr	Asn	Asn	Ser	Ala	Ser	Ile	Asp	Val	Thr	Phe	Thr	Ala	Leu	
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Ala	Asp	Asp	Gly	Arg	Lys	Leu	Gly	Tyr	Glu	Ile	Phe	Asn	Ile	Pro	
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Val	Ile	Gln	Lys	Val	Lys	Thr	Asp	Asn	Ala	Leu	Thr	Leu	Phe	His	
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Asp	Glu	Asn	Gly	Ala	Gln	Tyr	Met	Gln	Trp	Gly	Ala	Tyr	Arg	Ile	
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Arg	Leu	Asn	Thr	Leu	Phe	Ala	Arg	Gln	Leu	Val	Glu	Arg	Ala	Asn	
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Lys	Tyr	Asn	Pro	Asp	Ile	His	Gly	Thr	Asn	Lys	Ser	Phe	Lys	Ile	
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Ile	Tyr	Gly	Asp	Ile	Phe	Lys	Ala	Gly	Asp	His	Phe	Pro	Ile	Tyr	
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Gln	Gly	Ala	Leu	Ser	Asp	Ile	Thr	Gln	Thr	Thr	Val	Lys	Leu	Phe	
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Leu	Pro	Arg	Val	Asp	Asn	Ala	Tyr	Gly	Asn	Lys	Asn	Asn	Leu	Tyr	
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Lys	Asn	Gly	Thr	Phe	Pro	Gly	Leu	Ala	Ser	Ala	Arg	Val	Ile	Gln	
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Thr	Val	Ser	Glu	Pro	Met	Asp	Phe	Ser	Gly	Ala	Asn	Ser	Leu	Tyr	
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Phe	Trp	Glu	Leu	Phe	Tyr	Tyr	Thr	Pro	Met	Met	Val	Ala	Gln	Arg	
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Arg	Asp	Thr	Leu	Asn	Glu	Ala	Lys	Met	Trp	Tyr	Met	Gln	Ala	Leu	
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Gln	Pro	Leu	His	Leu	Pro	Ile	Tyr	Ala	Thr	Pro	Ala	Asp	Pro	Lys	
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Val	Leu	Glu	Lys	Ser	Lys	Ala	Gly	Ala	Lys	Ser	Arg	Phe	Asp	Asn	
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Tyr	Ser	Lys	Leu	Tyr	Asp	Glu	Asp	Val	Asn	Ala	Gly	Glu	Arg	Gln	
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Ile	Glu	Ala	Glu	Lys	Val	Ser	Gln	Ser	Glu	Ile	Trp	Arg	Arg	Arg	
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Lys	Gln	Ile	Asp	Ala	Gln	Leu	Lys	Ser	Leu	Thr	Val	Arg	Arg	Glu	
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Ala	Ala	Val	Leu	Gln	Lys	Thr	Gly	Leu	Lys	Thr	Gln	Gln	Glu	Gln	
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Arg	Gln	Gln	Val	Ser	Asp	His	Leu	Ser	Trp	Ser	Glu	Thr	Asn	Arg	Leu		
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Tyr	Arg	Asp	Ala	Gln	Gln	Glu	Gln	Lys	Glu	Asn	Gln	Leu	Tyr	Glu	Ala		
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Phe	Ser	Pro	Ala	Ala	Tyr	Leu	Thr	Glu	Leu	Tyr	Arg	Glu	Ala	Arg	Asn
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2090						2095					2100			
Thr	Gln	Ala	Gln	Leu	Ala	Phe	Leu	Gln	Arg	Lys	Phe	Ser	Asn	Gln
2105						2110					2115			
Ala	Leu	Tyr	Asn	Trp	Leu	Arg	Gly	Arg	Leu	Ala	Ala	Ile	Tyr	Phe
2120						2125					2130			
Gln	Phe	Tyr	Asp	Leu	Val	Val	Ala	Arg	Cys	Leu	Met	Ala	Glu	Gln
2135						2140					2145			
Ala	Tyr	Arg	Trp	Glu	Thr	Asn	Asp	Ser	Ser	Ala	Arg	Phe	Ile	Lys
2150						2155					2160			
Pro	Gly	Ala	Trp	Gln	Gly	Thr	Tyr	Ala	Gly	Leu	Leu	Ala	Gly	Glu
2165						2170					2175			
Thr	Leu	Met	Leu	Asn	Leu	Ala	Gln	Met	Glu	Asp	Ala	His	Leu	Lys
2180						2185					2190			
Gln	Glu	Gln	Arg	Ala	Leu	Glu	Val	Glu	Arg	Thr	Val	Ser	Leu	Ala
2195						2200					2205			
Gln	Val	Tyr	Gln	Ser	Leu	Gly	Glu	Lys	Ser	Phe	Ala	Leu	Lys	Asp
2210						2215					2220			
Lys	Ile	Glu	Ala	Leu	Leu	Gln	Gly	Asp	Lys	Glu	Thr	Ser	Ala	Gly
2225						2230					2235			
Asn	Asp	Gly	Asn	Gln	Leu	Lys	Leu	Thr	Asn	Asn	Thr	Leu	Ser	Ala
2240						2245					2250			
Thr	Leu	Thr	Leu	Gln	Asp	Leu	Lys	Leu	Lys	Asp	Asp	Tyr	Pro	Glu
2255						2260					2265			
Glu	Met	Gln	Leu	Gly	Lys	Thr	Arg	Arg	Ile	Lys	Gln	Ile	Ser	Val
2270						2275					2280			
Ser	Leu	Pro	Ala	Leu	Leu	Gly	Pro	Tyr	Gln	Asp	Val	Gln	Ala	Val
2285						2290					2295			
Leu	Ser	Tyr	Gly	Gly	Asp	Ala	Thr	Gly	Leu	Ala	Lys	Gly	Cys	Lys
2300						2305					2310			
Ala	Leu	Ala	Val	Ser	His	Gly	Leu	Asn	Asp	Asn	Gly	Gln	Phe	Gln
2315						2320					2325			
Leu	Asp	Phe	Asn	Asp	Gly	Lys	Phe	Leu	Pro	Phe	Glu	Gly	Ile	Asp
2330						2335					2340			
Ile	Asn	Asp	Lys	Gly	Thr	Phe	Thr	Leu	Ser	Phe	Pro	Asn	Ala	Ala
2345						2350					2355			
Ser	Lys	Gln	Lys	Asn	Ile	Leu	Gln	Met	Leu	Thr	Asp	Ile	Ile	Leu
2360						2365					2370			
His	Ile	Arg	Tyr	Thr	Ile	Leu	Glu							
2375						2380								

&lt;210&gt; 9

&lt;211&gt; 4425

&lt;212&gt; DNA

&lt;213&gt; Photorhabdus luminescens

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1)..(4422)

&lt;400&gt; 9

atg	caa	aat	tca	caa	gat	ttt	agt	att	acg	gaa	ctg	tca	ctg	ccc	aaa	48
Met	Gln	Asn	Ser	Gln	Asp	Phe	Ser	Ile	Thr	Glu	Leu	Ser	Leu	Pro	Lys	
1				5					10					15		

ggg	ggg	ggc	gct	atc	acg	gga	atg	ggg	gaa	gca	tta	acc	ccc	act	gga	96
Gly	Gly	Gly	Ala	Ile	Thr	Gly	Met	Gly	Glu	Ala	Leu	Thr	Pro	Thr	Gly	
			20					25					30			

ccg	gat	ggg	atg	gcc	gcg	cta	tct	cta	cca	ttg	cct	att	tct	gcc	ggg	144
Pro	Asp	Gly	Met	Ala	Ala	Leu	Ser	Leu	Pro	Leu	Pro	Ile	Ser	Ala	Gly	
		35					40					45				

cgc	ggg	tat	gct	ccc	gca	ttc	act	ctg	aat	tac	aac	agc	ggc	gcc	ggg	192
Arg	Gly	Tyr	Ala	Pro	Ala	Phe	Thr	Leu	Asn	Tyr	Asn	Ser	Gly	Ala	Gly	
	50					55					60					

aac	agt	cca	ttt	ggg	ctg	ggg	tgg	gat	tgc	aac	gtt	atg	act	atc	cgc	240
Asn	Ser	Pro	Phe	Gly	Leu	Gly	Trp	Asp	Cys	Asn	Val	Met	Thr	Ile	Arg	
65					70				75						80	

cgc	cgc	acc	cat	ttt	ggc	gtc	ccc	cat	tat	gac	gaa	acc	gat	acc	ttt	288
Arg	Arg	Thr	His	Phe	Gly	Val	Pro	His	Tyr	Asp	Glu	Thr	Asp	Thr	Phe	
				85					90					95		

ttg	ggg	cca	gaa	ggc	gaa	gtg	ctg	gtg	gta	gcg	gat	caa	cct	cgc	gac	336
Leu	Gly	Pro	Glu	Gly	Glu	Val	Leu	Val	Val	Ala	Asp	Gln	Pro	Arg	Asp	
			100					105					110			

gaa	tcc	aca	tta	cag	ggg	atc	aat	tta	ggc	gcc	acc	ttt	acc	gtt	acc	384
Glu	Ser	Thr	Leu	Gln	Gly	Ile	Asn	Leu	Gly	Ala	Thr	Phe	Thr	Val	Thr	
		115					120					125				

ggc	tac	cgt	tcc	cgt	ctg	gaa	agc	cat	ttc	agc	cga	ttg	gaa	tat	tgg	432
Gly	Tyr	Arg	Ser	Arg	Leu	Glu	Ser	His	Phe	Ser	Arg	Leu	Glu	Tyr	Trp	
	130					135					140					

caa	ccc	aaa	aca	aca	ggg	aaa	aca	gat	ttt	tgg	ttg	ata	tat	agc	cca	480
Gln	Pro	Lys	Thr	Thr	Gly	Lys	Thr	Asp	Phe	Trp	Leu	Ile	Tyr	Ser	Pro	
145					150					155					160	

gat	ggg	cag	gtg	cat	cta	ctg	ggg	aaa	tca	ccg	caa	gcg	cgg	atc	agc	528
Asp	Gly	Gln	Val	His	Leu	Leu	Gly	Lys	Ser	Pro	Gln	Ala	Arg	Ile	Ser	
				165					170					175		

aac	cca	tcc	caa	acg	aca	caa	aca	gca	caa	tgg	ctg	ctg	gaa	gcc	tct	576
Asn	Pro	Ser	Gln	Thr	Thr	Gln	Thr	Ala	Gln	Trp	Leu	Leu	Glu	Ala	Ser	
			180					185					190			

gta	tca	tca	cgt	ggc	gaa	caa	att	tat	tat	caa	tat	cgc	gcc	gaa	gat	624
Val	Ser	Ser	Arg	Gly	Glu	Gln	Ile	Tyr	Tyr	Gln	Tyr	Arg	Ala	Glu	Asp	
		195					200					205				

gac Asp 210	aca Thr	ggt Gly	tgc Cys	gaa Glu	gca Ala	gat Asp 215	gaa Glu	att Ile	acg Thr	cac His	cat His 220	tta Leu	cag Gln	gct Ala	aca Thr	672
gcg Ala 225	caa Gln	cgt Arg	tat Tyr	tta Leu	cac His 230	atc Ile	gtg Val	tat Tyr	tac Tyr	ggc Gly 235	aac Asn	cgt Arg	aca Thr	gcc Ala	agc Ser 240	720
gaa Glu	aca Thr	tta Leu	ccc Pro	ggt Gly 245	ctg Leu	gat Asp	ggc Gly	agc Ser	gcc Ala 250	cca Pro	tca Ser	caa Gln	gca Ala	gac Asp 255	tgg Trp	768
ttg Leu	ttc Phe	tat Tyr	ctg Leu 260	gta Val	ttt Phe	gat Asp	tac Tyr	ggc Gly 265	gaa Glu	cgc Arg	agt Ser	aac Asn 270	aac Asn	ctg Leu	aaa Lys	816
acg Thr	cca Pro	cca Pro	gca Ala	ttt Phe	tcg Ser	act Thr	aca Thr 280	ggt Gly	agc Ser	tgg Trp	ctt Leu	tgc Cys 285	cgt Arg	cag Gln	gac Asp	864
cgt Arg	ttt Phe	tcc Ser	cgt Arg	tat Tyr	gaa Glu	tat Tyr 295	ggc Gly	ttt Phe	gag Glu	att Ile	cgt Arg 300	acc Thr	cgc Arg	cgc Arg	tta Leu	912
tgc Cys 305	cgt Arg	cag Gln	gta Val	ttg Leu	atg Met 310	tac Tyr	cat His	cac His	ctg Leu	caa Gln 315	gca Ala	ctg Leu	gat Asp	agt Ser	aag Lys 320	960
ata Ile	aca Thr	gaa Glu	cac His	aac Asn 325	gga Gly	cca Pro	acg Thr	ctg Leu	gtt Val 330	tca Ser	cgc Arg	ctg Leu	ata Ile	ctc Leu 335	aat Asn	1008
tac Tyr	gac Asp	gaa Glu	agc Ser	gcg Ala	ata Ile	gcc Ala	agc Ser	acg Thr 345	cta Leu	gta Val	ttc Phe	gtt Val	cgc Arg 350	cga Arg	gtg Val	1056
gga Gly	cac His	gag Glu	caa Gln	gat Asp	ggt Gly	aat Asn 360	gtc Val	gtc Val	acc Thr	ctg Leu	ccg Pro	cca Pro 365	tta Leu	gaa Glu	ttg Leu	1104
gca Ala 370	tat Tyr	cag Gln	gat Asp	ttt Phe	tca Ser	ccg Pro 375	cga Arg	cat His	cac His	gct Ala	cac His 380	tgg Trp	caa Gln	cca Pro	atg Met	1152
gat Asp 385	gta Val	ctg Leu	gca Ala	aac Asn	ttc Phe 390	aat Asn	gcc Ala	att Ile	cag Gln	cgc Arg 395	tgg Trp	cag Gln	cta Leu	gtc Val	gat Asp 400	1200
cta Leu	aaa Lys	ggc Gly	gaa Glu	gga Gly 405	tta Leu	ccc Pro	ggc Gly	ctg Leu	tta Leu 410	tat Tyr	cag Gln	gat Asp	aaa Lys	ggc Gly 415	gct Ala	1248
tgg Trp	tgg Trp	tac Tyr	cgc Arg	tcc Ser	gca Ala	cag Gln	cgt Arg	ctg Leu 425	ggc Gly	gaa Glu	att Ile	ggc Gly	tca Ser 430	gat Asp	gcc Ala	1296
gtc Val	act Thr	tgg Trp	gaa Glu	aag Lys	atg Met	caa Gln	cct Pro 440	tta Leu	tcg Ser	gtt Val	att Ile	cct Pro 445	tct Ser	ttg Leu	caa Gln	1344
agt Ser 450	aat Asn	gcc Ala	tcg Ser	ttg Leu	gtg Val	gat Asp 455	atc Ile	aat Asn	gga Gly	gac Asp	ggc Gly 460	caa Gln	ctt Leu	gac Asp	tgg Trp	1392



gtt atc acc gga ccg gga tta cgg gga tat cat agt caa cgc ccg gat Val Ile Thr Gly Pro Gly Leu Arg Gly Tyr His Ser Gln Arg Pro Asp 465 470 475 480	1440
ggc agt tgg aca cgt ttt acc cca ctc aac gct ctg ccg gtg gaa tac Gly Ser Trp Thr Arg Phe Thr Pro Leu Asn Ala Leu Pro Val Glu Tyr 485 490 495	1488
acc cat cca cgc gcg caa ctc gca gat tta atg gga gcc ggg cta tcc Thr His Pro Arg Ala Gln Leu Ala Asp Leu Met Gly Ala Gly Leu Ser 500 505 510	1536
gat ttg gtg ctg atc ggc cct aag agc gtg cgt tta tat gcc aat acc Asp Leu Val Leu Ile Gly Pro Lys Ser Val Arg Leu Tyr Ala Asn Thr 515 520 525	1584
cgc gac ggc ttt gcc aaa gga aaa gat gtg gtg caa tcc ggt gat atc Arg Asp Gly Phe Ala Lys Gly Lys Asp Val Val Gln Ser Gly Asp Ile 530 535 540	1632
aca ctg ccg gtg ccg ggc gcc gat cca cgt aag ttg gtg gcg ttt agt Thr Leu Pro Val Pro Gly Ala Asp Pro Arg Lys Leu Val Ala Phe Ser 545 550 555 560	1680
gat gta ttg ggt tca ggt caa gcc cat ctg gtt gaa gta agc gcg act Asp Val Leu Gly Ser Gly Gln Ala His Leu Val Glu Val Ser Ala Thr 565 570 575	1728
aaa gtc acc tgc tgg cct aat ctg ggg cgc gga cgt ttt ggt caa ccc Lys Val Thr Cys Trp Pro Asn Leu Gly Arg Gly Arg Phe Gly Gln Pro 580 585 590	1776
att acc tta ccg gga ttc agc cag cca gca acc gag ttt aac ccg gct Ile Thr Leu Pro Gly Phe Ser Gln Pro Ala Thr Glu Phe Asn Pro Ala 595 600 605	1824
caa gtt tat ctg gcc gat ctg gat ggc agc ggt cca acg gat ctg att Gln Val Tyr Leu Ala Asp Leu Asp Gly Ser Gly Pro Thr Asp Leu Ile 610 615 620	1872
tat gtt cat aca aac cgt ctg gat atc ttc ctg aac aaa agt ggc aat Tyr Val His Thr Asn Arg Leu Asp Ile Phe Leu Asn Lys Ser Gly Asn 625 630 635 640	1920
ggc ttt gct gaa cca gtg aca tta cgc ttc ccg gaa ggt ctg cgt ttt Gly Phe Ala Glu Pro Val Thr Leu Arg Phe Pro Glu Gly Leu Arg Phe 645 650 655	1968
gat cat acc tgt cag tta caa atg gcc gat gta caa gga tta ggc gtc Asp His Thr Cys Gln Leu Gln Met Ala Asp Val Gln Gly Leu Gly Val 660 665 670	2016
gcc agc ctg ata ctg agc gtg ccg cat atg tct ccc cat cac tgg cgc Ala Ser Leu Ile Leu Ser Val Pro His Met Ser Pro His His Trp Arg 675 680 685	2064
tgc gat ctg acc aac atg aag ccg tgg tta ctc aat gaa atg aac aac Cys Asp Leu Thr Asn Met Lys Pro Trp Leu Leu Asn Glu Met Asn Asn 690 695 700	2112
aat atg ggg gtc cat cac acc ttg cgt tac cgc agt tcc tcc caa ttc Asn Met Gly Val His His Thr Leu Arg Tyr Arg Ser Ser Ser Gln Phe 705 710 715 720	2160

tgg ctg gat gaa aaa gcc gcg gcg ctg act acc gga caa aca ccg gtt	2208
Trp Leu Asp Glu Lys Ala Ala Ala Leu Thr Thr Gly Gln Thr Pro Val	
725 730 735	
tgc tat ctc ccc ttc ccg atc cac acc cta tgg caa acg gaa aca gaa	2256
Cys Tyr Leu Pro Phe Pro Ile His Thr Leu Trp Gln Thr Glu Thr Glu	
740 745 750	
gat gaa atc agc ggc aac aaa tta gtc aca aca ctt cgt tat gct cgt	2304
Asp Glu Ile Ser Gly Asn Lys Leu Val Thr Thr Leu Arg Tyr Ala Arg	
755 760 765	
ggc gca tgg gac gga cgc gag cgg gaa ttt cgc gga ttt ggt tat gta	2352
Gly Ala Trp Asp Gly Arg Glu Arg Glu Phe Arg Gly Phe Gly Tyr Val	
770 775 780	
gag cag aca gac agc cat caa ctg gct caa ggc aac gcg cca gaa cgt	2400
Glu Gln Thr Asp Ser His Gln Leu Ala Gln Gly Asn Ala Pro Glu Arg	
785 790 795 800	
acg cca ccg gcg ctg acc aaa aac tgg tat gcc acc gga ctg ccg gtg	2448
Thr Pro Pro Ala Leu Thr Lys Asn Trp Tyr Ala Thr Gly Leu Pro Val	
805 810 815	
ata gat aac gca tta tca acc gag tat tgg cgt gat gat cag gct ttt	2496
Ile Asp Asn Ala Leu Ser Thr Glu Tyr Trp Arg Asp Asp Gln Ala Phe	
820 825 830	
gcc ggt ttc tca ccg cgc ttt acg act tgg caa gat aac aaa gat gtc	2544
Ala Gly Phe Ser Pro Arg Phe Thr Thr Trp Gln Asp Asn Lys Asp Val	
835 840 845	
ccg tta aca ccg gaa gat gat aac agt cgt tac tgg ttc aac cgc gcg	2592
Pro Leu Thr Pro Glu Asp Asp Asn Ser Arg Tyr Trp Phe Asn Arg Ala	
850 855 860	
ttg aaa ggt caa ctg cta cgt agt gaa ctg tac gga ttg gac gat agt	2640
Leu Lys Gly Gln Leu Leu Arg Ser Glu Leu Tyr Gly Leu Asp Asp Ser	
865 870 875 880	
aca aat aaa cac gtt ccc tat act gtc act gaa ttt cgt tca cag gta	2688
Thr Asn Lys His Val Pro Tyr Thr Val Thr Glu Phe Arg Ser Gln Val	
885 890 895	
cgt cga tta cag cat acc gac agc cga tac cct gta ctt tgg tca tct	2736
Arg Arg Leu Gln His Thr Asp Ser Arg Tyr Pro Val Leu Trp Ser Ser	
900 905 910	
gta gtt gaa agc cgc aac tat cac tac gaa cgt atc gcc agc gac ccg	2784
Val Val Glu Ser Arg Asn Tyr His Tyr Glu Arg Ile Ala Ser Asp Pro	
915 920 925	
caa tgc agt caa aat att acg cta tcc agt gat cga ttt ggt cag ccg	2832
Gln Cys Ser Gln Asn Ile Thr Leu Ser Ser Asp Arg Phe Gly Gln Pro	
930 935 940	
cta aaa cag ctt tcg gta cag tac ccg cgc cgc cag cag cca gca atc	2880
Leu Lys Gln Leu Ser Val Gln Tyr Pro Arg Arg Gln Gln Pro Ala Ile	
945 950 955 960	
aat ctg tat cct gat aca ttg cct gat aag ttg tta gcc aac agc tat	2928
Asn Leu Tyr Pro Asp Thr Leu Pro Asp Lys Leu Leu Ala Asn Ser Tyr	
965 970 975	

gat gac caa caa cgc caa tta cgg ctc acc tat caa caa tcc agt tgg	2976
Asp Asp Gln Gln Arg Gln Leu Arg Leu Thr Tyr Gln Gln Ser Ser Trp	
980 985 990	
cat cac ctg acc aac aat acc gtt cga gta ttg gga tta ccg gat agt	3024
His His Leu Thr Asn Asn Thr Val Arg Val Leu Gly Leu Pro Asp Ser	
995 1000 1005	
acc cgc agt gat atc ttt act tat ggc gct gaa aat gtg cct gct	3069
Thr Arg Ser Asp Ile Phe Thr Tyr Gly Ala Glu Asn Val Pro Ala	
1010 1015 1020	
ggg ggt tta aat ctg gaa ctt ctg agt gat aaa aat agc ctg atc	3114
Gly Gly Leu Asn Leu Glu Leu Leu Ser Asp Lys Asn Ser Leu Ile	
1025 1030 1035	
gcg gac gat aaa cca cgt gaa tac ctc ggt cag caa aaa acc gct	3159
Ala Asp Asp Lys Pro Arg Glu Tyr Leu Gly Gln Gln Lys Thr Ala	
1040 1045 1050	
tat acc gat gga caa aat aca acg ccg ttg caa aca cca aca cgg	3204
Tyr Thr Asp Gly Gln Asn Thr Thr Pro Leu Gln Thr Pro Thr Arg	
1055 1060 1065	
caa gcc ctg att gcc ttt acc gaa aca acg gta ttc aac cag tcc	3249
Gln Ala Leu Ile Ala Phe Thr Glu Thr Thr Val Phe Asn Gln Ser	
1070 1075 1080	
aca tta tca gcg ttt aac gga agc atc ccg tcc gat aaa tta tca	3294
Thr Leu Ser Ala Phe Asn Gly Ser Ile Pro Ser Asp Lys Leu Ser	
1085 1090 1095	
acg acg ctg gag caa gct gga tat cag caa aca aat tat cta ttc	3339
Thr Thr Leu Glu Gln Ala Gly Tyr Gln Gln Thr Asn Tyr Leu Phe	
1100 1105 1110	
cct cgc act gga gaa gat aaa gtt tgg gta gcc cat cac ggc tat	3384
Pro Arg Thr Gly Glu Asp Lys Val Trp Val Ala His His Gly Tyr	
1115 1120 1125	
acc gat tat ggt aca gcg gca cag ttc tgg cgc ccg caa aaa cag	3429
Thr Asp Tyr Gly Thr Ala Ala Gln Phe Trp Arg Pro Gln Lys Gln	
1130 1135 1140	
agc aac acc caa ctc acc ggt aaa atc acc ctc atc tgg gat gca	3474
Ser Asn Thr Gln Leu Thr Gly Lys Ile Thr Leu Ile Trp Asp Ala	
1145 1150 1155	
aac tat tgc gtt gtg gta caa acc cgg gat gct gct gga ctg aca	3519
Asn Tyr Cys Val Val Val Gln Thr Arg Asp Ala Ala Gly Leu Thr	
1160 1165 1170	
acc tca gcc aaa tat gac tgg cgt ttt ctg acc ccg gtg caa ctc	3564
Thr Ser Ala Lys Tyr Asp Trp Arg Phe Leu Thr Pro Val Gln Leu	
1175 1180 1185	
acc gat atc aat gac aat cag cac ctt atc aca ctg gat gca ttg	3609
Thr Asp Ile Asn Asp Asn Gln His Leu Ile Thr Leu Asp Ala Leu	
1190 1195 1200	
ggc cga cca atc aca ttg cgc ttt tgg gga act gaa aac ggc aag	3654
Gly Arg Pro Ile Thr Leu Arg Phe Trp Gly Thr Glu Asn Gly Lys	
1205 1210 1215	

atg	aca	ggg	tat	tcc	tca	ccg	gaa	aaa	gca	tca	ttt	tct	cca	cca	3699
Met	Thr	Gly	Tyr	Ser	Ser	Pro	Glu	Lys	Ala	Ser	Phe	Ser	Pro	Pro	
	1220					1225					1230				
tcc	gat	gtt	aat	gcc	gct	att	gag	tta	aaa	aaa	ccg	ctc	cct	gta	3744
Ser	Asp	Val	Asn	Ala	Ala	Ile	Glu	Leu	Lys	Lys	Pro	Leu	Pro	Val	
	1235					1240					1245				
gca	cag	tgt	cag	gtc	tac	gca	cca	gaa	agc	tgg	atg	cca	gta	tta	3789
Ala	Gln	Cys	Gln	Val	Tyr	Ala	Pro	Glu	Ser	Trp	Met	Pro	Val	Leu	
	1250					1255					1260				
agt	cag	aaa	acc	ttc	aat	cga	ctg	gca	gaa	caa	gat	tgg	caa	aag	3834
Ser	Gln	Lys	Thr	Phe	Asn	Arg	Leu	Ala	Glu	Gln	Asp	Trp	Gln	Lys	
	1265					1270					1275				
tta	tat	aac	gcc	cga	atc	atc	acc	gaa	gat	gga	cgt	atc	tgc	aca	3879
Leu	Tyr	Asn	Ala	Arg	Ile	Ile	Thr	Glu	Asp	Gly	Arg	Ile	Cys	Thr	
	1280					1285					1290				
ctg	gct	tat	cgc	cgc	tgg	gta	caa	agc	caa	aag	gca	atc	cct	caa	3924
Leu	Ala	Tyr	Arg	Arg	Trp	Val	Gln	Ser	Gln	Lys	Ala	Ile	Pro	Gln	
	1295					1300					1305				
ctc	att	agc	ctg	tta	aac	aac	gga	ccc	cgt	tta	cct	cct	cac	agc	3969
Leu	Ile	Ser	Leu	Leu	Asn	Asn	Gly	Pro	Arg	Leu	Pro	Pro	His	Ser	
	1310					1315					1320				
ctg	aca	ttg	acg	acg	gat	cgt	tat	gat	cac	gat	cct	gag	caa	cag	4014
Leu	Thr	Leu	Thr	Thr	Asp	Arg	Tyr	Asp	His	Asp	Pro	Glu	Gln	Gln	
	1325					1330					1335				
atc	cgt	caa	cag	gtg	gta	ttc	agt	gat	ggc	ttt	ggc	cgc	ttg	ctg	4059
Ile	Arg	Gln	Gln	Val	Val	Phe	Ser	Asp	Gly	Phe	Gly	Arg	Leu	Leu	
	1340					1345					1350				
caa	gcc	gct	gcc	cga	cat	gag	gca	ggc	atg	gcc	cgg	caa	cgc	aat	4104
Gln	Ala	Ala	Ala	Arg	His	Glu	Ala	Gly	Met	Ala	Arg	Gln	Arg	Asn	
	1355					1360					1365				
gaa	gac	ggc	tct	ttg	att	ata	aat	gtc	cag	cat	act	gag	aac	cgt	4149
Glu	Asp	Gly	Ser	Leu	Ile	Ile	Asn	Val	Gln	His	Thr	Glu	Asn	Arg	
	1370					1375					1380				
tgg	gca	gtg	act	gga	cga	acg	gaa	tat	gac	aat	aag	ggg	caa	ccg	4194
Trp	Ala	Val	Thr	Gly	Arg	Thr	Glu	Tyr	Asp	Asn	Lys	Gly	Gln	Pro	
	1385					1390					1395				
ata	cgt	acc	tat	cag	ccc	tat	ttc	ctc	aat	gac	tgg	cga	tac	gtc	4239
Ile	Arg	Thr	Tyr	Gln	Pro	Tyr	Phe	Leu	Asn	Asp	Trp	Arg	Tyr	Val	
	1400					1405					1410				
agc	aat	gat	agt	gcc	cgg	cag	gaa	aaa	gaa	gct	tat	gca	gat	acc	4284
Ser	Asn	Asp	Ser	Ala	Arg	Gln	Glu	Lys	Glu	Ala	Tyr	Ala	Asp	Thr	
	1415					1420					1425				
cat	gtc	tat	gat	ccc	ata	ggg	cga	gaa	atc	aag	gtt	atc	acc	gca	4329
His	Val	Tyr	Asp	Pro	Ile	Gly	Arg	Glu	Ile	Lys	Val	Ile	Thr	Ala	
	1430					1435					1440				
aaa	ggg	tgg	ttc	cgt	cga	acc	ttg	ttc	act	ccc	tgg	ttt	act	gtc	4374
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aat gaa gat gaa aat gac aca gcc gct gag gtg aag aag gta aag 4419  
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<211> 1474

<212> PRT

<213> Photorhabdus luminescens

<400> 10

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Pro Asp Gly Met Ala Ala Leu Ser Leu Pro Leu Pro Ile Ser Ala Gly  
 35 40 45

Arg Gly Tyr Ala Pro Ala Phe Thr Leu Asn Tyr Asn Ser Gly Ala Gly  
 50 55 60

Asn Ser Pro Phe Gly Leu Gly Trp Asp Cys Asn Val Met Thr Ile Arg  
 65 70 75 80

Arg Arg Thr His Phe Gly Val Pro His Tyr Asp Glu Thr Asp Thr Phe  
 85 90 95

Leu Gly Pro Glu Gly Glu Val Leu Val Val Ala Asp Gln Pro Arg Asp  
 100 105 110

Glu Ser Thr Leu Gln Gly Ile Asn Leu Gly Ala Thr Phe Thr Val Thr  
 115 120 125

Gly Tyr Arg Ser Arg Leu Glu Ser His Phe Ser Arg Leu Glu Tyr Trp  
 130 135 140

Gln Pro Lys Thr Thr Gly Lys Thr Asp Phe Trp Leu Ile Tyr Ser Pro  
 145 150 155 160

Asp Gly Gln Val His Leu Leu Gly Lys Ser Pro Gln Ala Arg Ile Ser  
 165 170 175

Asn Pro Ser Gln Thr Thr Gln Thr Ala Gln Trp Leu Leu Glu Ala Ser  
 180 185 190

Val Ser Ser Arg Gly Glu Gln Ile Tyr Tyr Gln Tyr Arg Ala Glu Asp  
 195 200 205

Asp Thr Gly Cys Glu Ala Asp Glu Ile Thr His His Leu Gln Ala Thr  
 210 215 220

Ala Gln Arg Tyr Leu His Ile Val Tyr Tyr Gly Asn Arg Thr Ala Ser  
 225 230 235 240

Glu	Thr	Leu	Pro	Gly	Leu	Asp	Gly	Ser	Ala	Pro	Ser	Gln	Ala	Asp	Trp	
				245					250					255		
Leu	Phe	Tyr	Leu	Val	Phe	Asp	Tyr	Gly	Glu	Arg	Ser	Asn	Asn	Leu	Lys	
			260					265					270			
Thr	Pro	Pro	Ala	Phe	Ser	Thr	Thr	Gly	Ser	Trp	Leu	Cys	Arg	Gln	Asp	
		275					280					285				
Arg	Phe	Ser	Arg	Tyr	Glu	Tyr	Gly	Phe	Glu	Ile	Arg	Thr	Arg	Arg	Leu	
	290					295					300					
Cys	Arg	Gln	Val	Leu	Met	Tyr	His	His	Leu	Gln	Ala	Leu	Asp	Ser	Lys	
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Thr	His	Pro	Arg	Ala	Gln	Leu	Ala	Asp	Leu	Met	Gly	Ala	Gly	Leu	Ser	
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Arg	Asp	Gly	Phe	Ala	Lys	Gly	Lys	Asp	Val	Val	Gln	Ser	Gly	Asp	Ile	
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Lys	Val	Thr	Cys	Trp	Pro	Asn	Leu	Gly	Arg	Gly	Arg	Phe	Gly	Gln	Pro	



Gln Cys Ser Gln Asn Ile Thr Leu Ser Ser Asp Arg Phe Gly Gln Pro  
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 Leu Lys Gln Leu Ser Val Gln Tyr Pro Arg Arg Gln Gln Pro Ala Ile  
 945 950 955 960  
 Asn Leu Tyr Pro Asp Thr Leu Pro Asp Lys Leu Leu Ala Asn Ser Tyr  
 965 970 975  
 Asp Asp Gln Gln Arg Gln Leu Arg Leu Thr Tyr Gln Gln Ser Ser Trp  
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 His His Leu Thr Asn Asn Thr Val Arg Val Leu Gly Leu Pro Asp Ser  
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 Gly Gly Leu Asn Leu Glu Leu Leu Ser Asp Lys Asn Ser Leu Ile  
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 Ala Asp Asp Lys Pro Arg Glu Tyr Leu Gly Gln Gln Lys Thr Ala  
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 Tyr Thr Asp Gly Gln Asn Thr Thr Pro Leu Gln Thr Pro Thr Arg  
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 Thr Thr Leu Glu Gln Ala Gly Tyr Gln Gln Thr Asn Tyr Leu Phe  
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 Pro Arg Thr Gly Glu Asp Lys Val Trp Val Ala His His Gly Tyr  
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 Thr Asp Ile Asn Asp Asn Gln His Leu Ile Thr Leu Asp Ala Leu  
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 Ser Asp Val Asn Ala Ala Ile Glu Leu Lys Lys Pro Leu Pro Val  
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Ser	Gln	Lys	Thr	Phe	Asn	Arg	Leu	Ala	Glu	Gln	Asp	Trp	Gln	Lys
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1325						1330					1335			
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Trp	Ala	Val	Thr	Gly	Arg	Thr	Glu	Tyr	Asp	Asn	Lys	Gly	Gln	Pro
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Met

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&lt;212&gt; DNA

&lt;213&gt; Photorhabdus luminescens

&lt;220&gt;

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&lt;222&gt; (1)..(2880)

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48

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act Thr	acc Thr	gca Ala	aat Asn	ggt Gly	gat Asp	ccc Pro	gat Asp	acc Thr	cgt Arg	att Ile	acc Thr	cgc Arg	cat His	caa Gln	tac Tyr		144
gat Asp	att Ile	cac His	gga Gly	cac His	cta Leu	aat Asn	caa Gln	agc Ser	atc Ile	gat Asp	ccg Pro	cgc Arg	cta Leu	tat Tyr	gaa Glu		192
gcc Ala	aag Lys	caa Gln	acc Thr	aac Asn	aat Asn	acg Thr	atc Ile	aaa Lys	ccc Pro	aat Asn	ttt Phe	ctt Leu	tgg Trp	cag Gln	tat Tyr		240
gat Asp	ttg Leu	acc Thr	ggt Gly	aat Asn	ccc Pro	cta Leu	tgt Cys	aca Thr	gag Glu	agc Ser	att Ile	gat Asp	gca Ala	ggt Gly	cgc Arg		288
act Thr	gtc Val	acc Thr	ttg Leu	aat Asn	gat Asp	att Ile	gaa Glu	ggc Gly	cgt Arg	ccg Pro	cta Leu	cta Leu	acg Thr	gtg Val	act Thr		336
gca Ala	aca Thr	ggg Gly	gtt Val	ata Ile	caa Gln	act Thr	cga Arg	caa Gln	tat Tyr	gaa Glu	act Thr	tct Ser	tcc Ser	ctg Leu	ccc Pro		384
ggt Gly	cgt Arg	ctg Leu	tta Leu	tct Ser	gtt Val	gcc Ala	gaa Glu	caa Gln	aca Thr	ccc Pro	gag Glu	gaa Glu	aaa Lys	aca Thr	tcc Ser		432
cgt Arg	atc Ile	acc Thr	gaa Glu	cgc Arg	ctg Leu	att Ile	tgg Trp	gct Ala	ggc Gly	aat Asn	acc Thr	gaa Glu	gca Ala	gag Glu	aaa Lys		480
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tcc Ser	agc Ser	caa Gln	cta Leu	ttg Leu	atc Ile	gac Asp	act Thr	caa Gln	gag Glu	gca Ala	aac Asn	tgg Trp	aca Thr	ggt Gly	gat Asp		624
aac Asn	gaa Glu	acc Thr	gtc Val	tgg Trp	caa Gln	aac Asn	atg Met	ctg Leu	gct Ala	gat Asp	gac Asp	atc Ile	tac Tyr	aca Thr	acc Thr		672
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aaa Lys	ggg Gly	aac Asn	att Ile	cag Gln	aga Arg	ctg Leu	gct Ala	tat Tyr	gat Asp	gtg Val	gcc Ala	ggg Gly	cag Gln	cta Leu	aac Asn		768
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Ala	Leu	Pro	Ser	Asp	Asn	Asn	Thr	Tyr	Thr	Asn	Tyr	Thr	Arg	Thr	Tyr	
385					390				395						400	
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Thr	Tyr	Asp	Arg	Gly	Gly	Asn	Leu	Thr	Lys	Ile	Gln	His	Ser	Ser	Pro	
				405					410					415		
gcg	acg	caa	aac	aac	tac	acc	acc	aat	atc	acg	gtt	tca	aat	cgc	agc	1296
Ala	Thr	Gln	Asn	Asn	Tyr	Thr	Thr	Asn	Ile	Thr	Val	Ser	Asn	Arg	Ser	
			420					425					430			
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Lys	Arg	Asp	Lys	Gly	Ala	Asn	Asp	Asp	Arg	Glu	Trp	Tyr	Arg	Tyr	Ser	
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ggc	gac	gga	aga	agg	atg	tta	aaa	atc	aat	gaa	cag	cag	gcc	agc	aac	1536
Gly	Asp	Gly	Arg	Arg	Met	Leu	Lys	Ile	Asn	Glu	Gln	Gln	Ala	Ser	Asn	
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Leu	Thr	Gln	Asn	Ser	Thr	Ala	Thr	Thr	Glu	Asp	Leu	Gln	Val	Ile	Thr		
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Val	Gly	Glu	Ala	Gly	Arg	Ala	Gln	Val	Arg	Val	Leu	His	Trp	Glu	Ser		
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ggt	aaa	ccg	gaa	gat	atc	gac	aat	aat	cag	ttg	cgt	tat	agt	tac	gat	1728	
Gly	Lys	Pro	Glu	Asp	Ile	Asp	Asn	Asn	Gln	Leu	Arg	Tyr	Ser	Tyr	Asp		
				565					570					575			
aat	ctt	atc	ggt	tcc	agt	caa	ctt	gaa	tta	gat	agc	gaa	gga	caa	att	1776	
Asn	Leu	Ile	Gly	Ser	Ser	Gln	Leu	Glu	Leu	Asp	Ser	Glu	Gly	Gln	Ile		
			580						585				590				
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Gln	Pro	Trp	Ile	Gly	Arg	Trp	Leu	Ser	Ser	Asp	Pro	Ala	Gly	Thr	Ile		
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gat	ggg	ctg	aat	tta	tat	cgg	atg	gtg	agg	aat	aat	cca	gtt	acc	ctc	2016	
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Leu	Asp	Pro	Asp	Gly	Leu	Met	Pro	Thr	Ile	Ala	Glu	Arg	Ile	Ala	Ala		
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cta	aaa	aaa	aat	aaa	gta	aca	gac	tca	gcg	cct	tcg	cca	gca	aat	gcc	2112	
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Thr	Asn	Val	Ala	Ile	Asn	Ile	Arg	Pro	Pro	Val	Ala	Pro	Lys	Pro	Ser		
					710					715					720		
tta	ccg	aaa	gca	tca	acg	agt	agc	caa	cca	acc	aca	cac	cct	atc	gga	2208	
Leu	Pro	Lys	Ala	Ser	Thr	Ser	Ser	Gln	Pro	Thr	Thr	His	Pro	Ile	Gly		
				725					730					735			
gct	gca	aac	ata	aaa	cca	acg	acg	tct	ggg	tca	tct	att	gtt	gct	cca	2256	
Ala	Ala	Asn	Ile	Lys	Pro	Thr	Thr	Ser	Gly	Ser	Ser	Ile	Val	Ala	Pro		
			740					745					750				
ttg	agt	cca	gta	gga	aat	aaa	tct	act	tct	gaa	atc	tct	ctg	cca	gaa	2304	
Leu	Ser	Pro	Val	Gly	Asn	Lys	Ser	Thr	Ser	Glu	Ile	Ser	Leu	Pro	Glu		
		755					760					765					
agc	gct	caa	agc	agt	tct	tca	agc	act	acc	tcg	aca	aat	cta	cag	aaa	2352	

Ser	Ala	Gln	Ser	Ser	Ser	Ser	Ser	Thr	Thr	Ser	Thr	Asn	Leu	Gln	Lys	
770						775					780					
aaa	tca	ttt	act	tta	tat	aga	gca	gat	aac	aga	tcc	ttt	gaa	gaa	atg	2400
Lys	Ser	Phe	Thr	Leu	Tyr	Arg	Ala	Asp	Asn	Arg	Ser	Phe	Glu	Glu	Met	
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caa	agt	aaa	ttc	cct	gaa	gga	ttt	aaa	gcc	tgg	act	cct	cta	gac	act	2448
Gln	Ser	Lys	Phe	Pro	Glu	Gly	Phe	Lys	Ala	Trp	Thr	Pro	Leu	Asp	Thr	
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Lys	Met	Ala	Arg	Gln	Phe	Ala	Ser	Ile	Phe	Ile	Gly	Gln	Lys	Asp	Thr	
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Ser	Asn	Leu	Pro	Lys	Glu	Thr	Val	Lys	Asn	Ile	Ser	Thr	Trp	Gly	Ala	
		835					840					845				
aag	cca	aaa	cta	aaa	gat	ctc	tca	aat	tac	ata	aaa	tat	acc	aag	gac	2592
Lys	Pro	Lys	Leu	Lys	Asp	Leu	Ser	Asn	Tyr	Ile	Lys	Tyr	Thr	Lys	Asp	
	850					855					860					
aaa	tct	aca	gta	tgg	gtt	tct	act	gca	att	aat	act	gaa	gca	ggg	gga	2640
Lys	Ser	Thr	Val	Trp	Val	Ser	Thr	Ala	Ile	Asn	Thr	Glu	Ala	Gly	Gly	
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caa	agc	tca	ggg	gct	cca	ctc	cat	aaa	att	gat	atg	gat	ctc	tac	gag	2688
Gln	Ser	Ser	Gly	Ala	Pro	Leu	His	Lys	Ile	Asp	Met	Asp	Leu	Tyr	Glu	
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ttt	gcc	att	gat	gga	caa	aaa	cta	aat	cca	cta	ccg	gag	ggg	aga	act	2736
Phe	Ala	Ile	Asp	Gly	Gln	Lys	Leu	Asn	Pro	Leu	Pro	Glu	Gly	Arg	Thr	
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Lys	Asn	Met	Val	Pro	Ser	Leu	Leu	Leu	Asp	Thr	Pro	Gln	Ile	Glu	Thr	
		915					920					925				
tca	tcc	atc	att	gca	ctt	aat	cat	gga	ccg	gta	aat	gat	gca	gaa	att	2832
Ser	Ser	Ile	Ile	Ala	Leu	Asn	His	Gly	Pro	Val	Asn	Asp	Ala	Glu	Ile	
		930				935					940					
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Ser	Phe	Leu	Thr	Thr	Ile	Pro	Leu	Lys	Asn	Val	Lys	Pro	His	Lys	Arg	
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1				5					10					15		
Val	Tyr	Asp	Asn	Arg	Gly	Leu	Ile	Ile	Arg	Asn	Ile	Asp	Phe	His	Arg	
			20					25					30			

Thr Thr Ala Asn Gly Asp Pro Asp Thr Arg Ile Thr Arg His Gln Tyr  
 35 40 45  
 Asp Ile His Gly His Leu Asn Gln Ser Ile Asp Pro Arg Leu Tyr Glu  
 50 55 60  
 Ala Lys Gln Thr Asn Asn Thr Ile Lys Pro Asn Phe Leu Trp Gln Tyr  
 65 70 75 80  
 Asp Leu Thr Gly Asn Pro Leu Cys Thr Glu Ser Ile Asp Ala Gly Arg  
 85 90 95  
 Thr Val Thr Leu Asn Asp Ile Glu Gly Arg Pro Leu Leu Thr Val Thr  
 100 105 110  
 Ala Thr Gly Val Ile Gln Thr Arg Gln Tyr Glu Thr Ser Ser Leu Pro  
 115 120 125  
 Gly Arg Leu Leu Ser Val Ala Glu Gln Thr Pro Glu Glu Lys Thr Ser  
 130 135 140  
 Arg Ile Thr Glu Arg Leu Ile Trp Ala Gly Asn Thr Glu Ala Glu Lys  
 145 150 155 160  
 Asp His Asn Leu Ala Gly Gln Cys Val Arg His Tyr Asp Thr Ala Gly  
 165 170 175  
 Val Thr Arg Leu Glu Ser Leu Ser Leu Thr Gly Thr Val Leu Ser Gln  
 180 185 190  
 Ser Ser Gln Leu Leu Ile Asp Thr Gln Glu Ala Asn Trp Thr Gly Asp  
 195 200 205  
 Asn Glu Thr Val Trp Gln Asn Met Leu Ala Asp Asp Ile Tyr Thr Thr  
 210 215 220  
 Leu Ser Thr Phe Asp Ala Thr Gly Ala Leu Leu Thr Gln Thr Asp Ala  
 225 230 235 240  
 Lys Gly Asn Ile Gln Arg Leu Ala Tyr Asp Val Ala Gly Gln Leu Asn  
 245 250 255  
 Gly Ser Trp Leu Thr Leu Lys Gly Gln Thr Glu Gln Val Ile Ile Lys  
 260 265 270  
 Ser Leu Thr Tyr Ser Ala Ala Gly Gln Lys Leu Arg Glu Glu His Gly  
 275 280 285  
 Asn Asp Val Ile Thr Glu Tyr Ser Tyr Glu Pro Glu Thr Gln Arg Leu  
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 Ile Gly Ile Lys Thr Arg Arg Pro Ser Asp Thr Lys Val Leu Gln Asp  
 305 310 315 320  
 Leu Arg Tyr Glu Tyr Asp Pro Val Gly Asn Val Ile Ser Ile Arg Asn  
 325 330 335  
 Asp Ala Glu Ala Thr Arg Phe Trp His Asn Gln Lys Val Met Pro Glu  
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 Asn Thr Tyr Thr Tyr Asp Ser Leu Tyr Gln Leu Ile Ser Ala Thr Gly  
 355 360 365

Arg	Glu	Met	Ala	Asn	Ile	Gly	Gln	Gln	Ser	His	Gln	Phe	Pro	Ser	Pro	370	375	380	
Ala	Leu	Pro	Ser	Asp	Asn	Asn	Thr	Tyr	Thr	Asn	Tyr	Thr	Arg	Thr	Tyr	385	390	395	400
Thr	Tyr	Asp	Arg	Gly	Gly	Asn	Leu	Thr	Lys	Ile	Gln	His	Ser	Ser	Pro	405	410	415	
Ala	Thr	Gln	Asn	Asn	Tyr	Thr	Thr	Asn	Ile	Thr	Val	Ser	Asn	Arg	Ser	420	425	430	
Asn	Arg	Ala	Val	Leu	Ser	Thr	Leu	Thr	Glu	Asp	Pro	Ala	Gln	Val	Asp	435	440	445	
Ala	Leu	Phe	Asp	Ala	Gly	Gly	His	Gln	Asn	Thr	Leu	Ile	Ser	Gly	Gln	450	455	460	
Asn	Leu	Asn	Trp	Asn	Thr	Arg	Gly	Glu	Leu	Gln	Gln	Val	Thr	Leu	Val	465	470	475	480
Lys	Arg	Asp	Lys	Gly	Ala	Asn	Asp	Asp	Arg	Glu	Trp	Tyr	Arg	Tyr	Ser	485	490	495	
Gly	Asp	Gly	Arg	Arg	Met	Leu	Lys	Ile	Asn	Glu	Gln	Gln	Ala	Ser	Asn	500	505	510	
Asn	Ala	Gln	Thr	Gln	Arg	Val	Thr	Tyr	Leu	Pro	Asn	Leu	Glu	Leu	Arg	515	520	525	
Leu	Thr	Gln	Asn	Ser	Thr	Ala	Thr	Thr	Glu	Asp	Leu	Gln	Val	Ile	Thr	530	535	540	
Val	Gly	Glu	Ala	Gly	Arg	Ala	Gln	Val	Arg	Val	Leu	His	Trp	Glu	Ser	545	550	555	560
Gly	Lys	Pro	Glu	Asp	Ile	Asp	Asn	Asn	Gln	Leu	Arg	Tyr	Ser	Tyr	Asp	565	570	575	
Asn	Leu	Ile	Gly	Ser	Ser	Gln	Leu	Glu	Leu	Asp	Ser	Glu	Gly	Gln	Ile	580	585	590	
Ile	Ser	Glu	Glu	Glu	Tyr	Tyr	Pro	Tyr	Gly	Gly	Thr	Ala	Leu	Trp	Ala	595	600	605	
Ala	Arg	Asn	Gln	Thr	Glu	Ala	Ser	Tyr	Lys	Thr	Ile	Arg	Tyr	Ser	Gly	610	615	620	
Lys	Glu	Arg	Asp	Ala	Thr	Gly	Leu	Tyr	Tyr	Tyr	Gly	Tyr	Arg	Tyr	Tyr	625	630	635	640
Gln	Pro	Trp	Ile	Gly	Arg	Trp	Leu	Ser	Ser	Asp	Pro	Ala	Gly	Thr	Ile	645	650	655	
Asp	Gly	Leu	Asn	Leu	Tyr	Arg	Met	Val	Arg	Asn	Asn	Pro	Val	Thr	Leu	660	665	670	
Leu	Asp	Pro	Asp	Gly	Leu	Met	Pro	Thr	Ile	Ala	Glu	Arg	Ile	Ala	Ala	675	680	685	
Leu	Lys	Lys	Asn	Lys	Val	Thr	Asp	Ser	Ala	Pro	Ser	Pro	Ala	Asn	Ala	690	695	700	
Thr	Asn	Val	Ala	Ile	Asn	Ile	Arg	Pro	Pro	Val	Ala	Pro	Lys	Pro	Ser				

705	710					715					720				
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Ala	Ala	Asn	Ile	Lys	Pro	Thr	Thr	Ser	Gly	Ser	Ser	Ile	Val	Ala	Pro
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Ser	Ala	Gln	Ser	Ser	Ser	Ser	Ser	Thr	Thr	Ser	Thr	Asn	Leu	Gln	Lys
	770					775					780				
Lys	Ser	Phe	Thr	Leu	Tyr	Arg	Ala	Asp	Asn	Arg	Ser	Phe	Glu	Glu	Met
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Gln	Ser	Lys	Phe	Pro	Glu	Gly	Phe	Lys	Ala	Trp	Thr	Pro	Leu	Asp	Thr
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Lys	Met	Ala	Arg	Gln	Phe	Ala	Ser	Ile	Phe	Ile	Gly	Gln	Lys	Asp	Thr
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Ser	Asn	Leu	Pro	Lys	Glu	Thr	Val	Lys	Asn	Ile	Ser	Thr	Trp	Gly	Ala
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Lys	Pro	Lys	Leu	Lys	Asp	Leu	Ser	Asn	Tyr	Ile	Lys	Tyr	Thr	Lys	Asp
	850					855					860				
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865					870					875					880
Gln	Ser	Ser	Gly	Ala	Pro	Leu	His	Lys	Ile	Asp	Met	Asp	Leu	Tyr	Glu
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Phe	Ala	Ile	Asp	Gly	Gln	Lys	Leu	Asn	Pro	Leu	Pro	Glu	Gly	Arg	Thr
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Lys	Asn	Met	Val	Pro	Ser	Leu	Leu	Leu	Asp	Thr	Pro	Gln	Ile	Glu	Thr
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	930					935					940				
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&lt;211&gt; 2850

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&lt;213&gt; Photorhabdus luminescens

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&lt;222&gt; (1)..(2847)

&lt;400&gt; 13

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 Met Lys Asn Ile Asp Pro Lys Leu Tyr Gln His Thr Pro Thr Val Asn



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gac gtc gcg gga ggc gat aca gat act cgt att acc cgc cac caa tat Asp Val Ala Gly Gly Asp Thr Asp Thr Arg Ile Thr Arg His Gln Tyr 35 40 45				144
gat acc cga gga cac ttg agc caa agc att gat cca cgg ctg tat gac Asp Thr Arg Gly His Leu Ser Gln Ser Ile Asp Pro Arg Leu Tyr Asp 50 55 60				192
gcc aaa caa acc aat aac tcg aca aac ccc aac ttc ctc tgg caa tac Ala Lys Gln Thr Asn Asn Ser Thr Asn Pro Asn Phe Leu Trp Gln Tyr 65 70 75 80				240
aat ctc acc ggc gac act ttg cgg aca gaa agt gtc gat gcc ggc cgt Asn Leu Thr Gly Asp Thr Leu Arg Thr Glu Ser Val Asp Ala Gly Arg 85 90 95				288
acc gta gcc ctc aat gat att gaa ggc cgt caa gtg ttg att gta acc Thr Val Ala Leu Asn Asp Ile Glu Gly Arg Gln Val Leu Ile Val Thr 100 105 110				336
gca acc ggc gcc att cag acc cga caa tat gaa gcc aat acc ctg ccc Ala Thr Gly Ala Ile Gln Thr Arg Gln Tyr Glu Ala Asn Thr Leu Pro 115 120 125				384
ggt cgt cta tta tcc gta agt gaa caa gcc ccc gga gaa cag act ccc Gly Arg Leu Leu Ser Val Ser Glu Gln Ala Pro Gly Glu Gln Thr Pro 130 135 140				432
cgc gtt act gag cat ttt att tgg gct ggt aat aca cag gcg gag aaa Arg Val Thr Glu His Phe Ile Trp Ala Gly Asn Thr Gln Ala Glu Lys 145 150 155 160				480
gat cat aat ctt gcc ggc cag tat gtg cgc cac tac gac aca gca gga Asp His Asn Leu Ala Gly Gln Tyr Val Arg His Tyr Asp Thr Ala Gly 165 170 175				528
gtg acg caa ctg gaa agc ctg tca ttg aca gaa aac atc tta tct caa Val Thr Gln Leu Glu Ser Leu Ser Leu Thr Glu Asn Ile Leu Ser Gln 180 185 190				576
tcc cgt cag tta tta gcc gac ggt cag gaa gca gac tgg aca ggt aac Ser Arg Gln Leu Leu Ala Asp Gly Gln Glu Ala Asp Trp Thr Gly Asn 195 200 205				624
gat gaa acc ctc tgg cag acc aaa ctc aat agc gaa act tac acg aca Asp Glu Thr Leu Trp Gln Thr Lys Leu Asn Ser Glu Thr Tyr Thr Thr 210 215 220				672
caa agc acc ttt gat gct acc ggc gct ttg ctg acc caa acc gat gca Gln Ser Thr Phe Asp Ala Thr Gly Ala Leu Leu Thr Gln Thr Asp Ala 225 230 235 240				720
aaa ggc aac atg caa cgt ctg gct tac aac gtg gca gga caa tta caa Lys Gly Asn Met Gln Arg Leu Ala Tyr Asn Val Ala Gly Gln Leu Gln 245 250 255				768
ggt agc tgg ctg aca ttg aaa aac caa agt gag caa gtc att gtc aaa Gly Ser Trp Leu Thr Leu Lys Asn Gln Ser Glu Gln Val Ile Val Lys				816

260				265				270								
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Ser	Leu	Thr	Tyr	Ser	Ala	Ala	Gly	Gln	Lys	Leu	Arg	Glu	Glu	His	Gly	
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Asn	Gly	Val	Ile	Thr	Glu	Tyr	Ser	Tyr	Glu	Pro	Glu	Thr	Leu	Arg	Leu	
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atc	ggc	acc	act	act	cgc	cgt	caa	tca	gat	agc	aag	gtg	tta	caa	gat	960
Ile	Gly	Thr	Thr	Thr	Arg	Arg	Gln	Ser	Asp	Ser	Lys	Val	Leu	Gln	Asp	
305					310					315					320	
cta	cgc	tat	gaa	cat	gat	cct	gta	ggg	aat	att	att	agt	gtc	cgt	aat	1008
Leu	Arg	Tyr	Glu	His	Asp	Pro	Val	Gly	Asn	Ile	Ile	Ser	Val	Arg	Asn	
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gat	gca	gaa	gcc	acc	cgc	ttc	tgg	cgc	aat	cag	aaa	ata	gtc	cct	gaa	1056
Asp	Ala	Glu	Ala	Thr	Arg	Phe	Trp	Arg	Asn	Gln	Lys	Ile	Val	Pro	Glu	
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aat	acc	tac	acc	tac	gat	tcc	ctg	tat	cag	ctt	atc	agt	gca	aca	gga	1104
Asn	Thr	Tyr	Thr	Tyr	Asp	Ser	Leu	Tyr	Gln	Leu	Ile	Ser	Ala	Thr	Gly	
		355					360					365				
cgt	gag	atg	gct	aac	atc	ggc	cag	caa	agc	aac	caa	ctt	cct	tcg	cca	1152
Arg	Glu	Met	Ala	Asn	Ile	Gly	Gln	Gln	Ser	Asn	Gln	Leu	Pro	Ser	Pro	
	370					375					380					
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Ser	Pro	Ala	Ala	Gln	Asn	Asn	Tyr	Thr	Thr	Asp	Ile	Thr	Val	Ser	Asn	
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Arg	Ser	Asn	Arg	Ala	Val	Leu	Ser	Ser	Leu	Thr	Ser	Asp	Pro	Thr	Gln	
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Pro	Val	Ser	Arg	Glu	Ser	Ala	Ser	Asp	Arg	Glu	Trp	Tyr	Arg	Tyr	Gly	
				485					490					495		
aac	gac	ggc	atg	cga	cgg	tta	aaa	gtc	agt	gag	caa	cag	act	ggc	aac	1536
Asn	Asp	Gly	Met	Arg	Arg	Leu	Lys	Val	Ser	Glu	Gln	Gln	Thr	Gly	Asn	
			500					505					510			
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Ser	Thr	Gln	Gln	Gln	Arg	Val	Thr	Tyr	Leu	Pro	Asp	Leu	Glu	Leu	Arg	

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aca	aca	caa	aat	ggg	act	act	aca	tca	gaa	gac	ctg	cat	gct	att	acc	1632				
Thr	Thr	Gln	Asn	Gly	Thr	Thr	Thr	Ser	Glu	Asp	Leu	His	Ala	Ile	Thr					
	530					535					540									
gtg	gga	gca	gca	ggc	cac	gca	caa	gtg	cga	gtt	cta	cac	tgg	gaa	act	1680				
Val	Gly	Ala	Ala	Gly	His	Ala	Gln	Val	Arg	Val	Leu	His	Trp	Glu	Thr					
	545				550					555					560					
acg	cca	cca	gcc	ggg	atc	aat	aac	aat	cag	ctt	cgc	tat	agc	tat	gat	1728				
Thr	Pro	Pro	Ala	Gly	Ile	Asn	Asn	Asn	Gln	Leu	Arg	Tyr	Ser	Tyr	Asp					
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Ile	Ser	Gln	Glu	Glu	Tyr	Tyr	Pro	Phe	Gly	Gly	Thr	Ala	Leu	Trp	Ala					
		595					600					605								
gca	aga	aac	caa	ata	gaa	gcc	agc	tac	aaa	atc	ctc	cgt	tac	tca	ggg	1872				
Ala	Arg	Asn	Gln	Ile	Glu	Ala	Ser	Tyr	Lys	Ile	Leu	Arg	Tyr	Ser	Gly					
	610					615					620									
aaa	gaa	cgc	gat	gct	acc	ggg	ctc	tat	tat	tac	ggc	tac	cgc	tat	tat	1920				
Lys	Glu	Arg	Asp	Ala	Thr	Gly	Leu	Tyr	Tyr	Tyr	Gly	Tyr	Arg	Tyr	Tyr					
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Gln	Pro	Trp	Val	Gly	Arg	Trp	Leu	Ser	Ala	Asp	Pro	Ala	Gly	Thr	Ile					
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gat	gga	ctg	aat	cta	tac	cgg	atg	gtg	aga	aat	aat	ccg	tca	aca	ctg	2016				
Asp	Gly	Leu	Asn	Leu	Tyr	Arg	Met	Val	Arg	Asn	Asn	Pro	Ser	Thr	Leu					
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Val	Asp	Ile	Ser	Gly	Leu	Ala	Pro	Thr	Lys	Tyr	Asn	Ile	Pro	Gly	Phe					
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Asp	Phe	Asp	Val	Glu	Ile	Asp	Glu	Gln	Lys	Arg	Ser	Lys	Leu	Lys	Pro					
	690					695					700									
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Thr	Leu	Ile	Arg	Ile	Lys	Asp	Glu	Phe	Leu	His	Tyr	Gly	Pro	Val	Asp					
	705				710					715					720					
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Phe	Asp	Arg	Gly	Pro	Ser	Glu	Asn	Gly	Val	Ser	Thr	Leu	Thr	Phe	Lys					
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aaa	gac	cta	ccg	ata	agt	tgt	att	agc	aac	aca	gaa	tat	acc	ctt	gat	2304				
Lys	Asp	Leu	Pro	Ile	Ser	Cys	Ile	Ser	Asn	Thr	Glu	Tyr	Thr	Leu	Asp					
		755					760					765								
atc	tta	tac	aac	aaa	cat	gag	act	aaa	cca	ttc	cct	tac	gaa	aac	gaa	2352				
Ile	Leu	Tyr	Asn	Lys	His	Glu	Thr	Lys	Pro	Phe	Pro	Tyr	Glu	Asn	Glu					

770	775	780	
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aat aaa tca ata ggt aat gcc tct gac gaa gat tta aaa gaa gaa cat Asn Lys Ser Ile Gly Asn Ala Ser Asp Glu Asp Leu Lys Glu Glu His 805 810 815			2448
ctc cca tta gga aaa tcc aca atg gat aaa aca gac ctg cca gat tta Leu Pro Leu Gly Lys Ser Thr Met Asp Lys Thr Asp Leu Pro Asp Leu 820 825 830			2496
aaa caa ggg cta atg atc gcg gag aag ata aaa agt gga aaa ggg gca Lys Gln Gly Leu Met Ile Ala Glu Lys Ile Lys Ser Gly Lys Gly Ala 835 840 845			2544
tat cct ttt cat ttt ggt gct gca ata gct gtt gta tat ggt gag gat Tyr Pro Phe His Phe Gly Ala Ala Ile Ala Val Val Tyr Gly Glu Asp 850 855 860			2592
aaa aaa gta gcc gct tca att ctg aca gat tta tct gaa cct aaa aga Lys Lys Val Ala Ala Ser Ile Leu Thr Asp Leu Ser Glu Pro Lys Arg 865 870 875 880			2640
gac gaa ggc gag tat ttg caa agt acg aga aag gta agc gca atg ttt Asp Glu Gly Glu Tyr Leu Gln Ser Thr Arg Lys Val Ser Ala Met Phe 885 890 895			2688
atc aca aac gtc aat gaa ttt cgc ggc cat gat tac cca aaa agt aaa Ile Thr Asn Val Asn Glu Phe Arg Gly His Asp Tyr Pro Lys Ser Lys 900 905 910			2736
tat agt atc gga tta gtt aca gct gaa aaa cgt cag cca gta ata agc Tyr Ser Ile Gly Leu Val Thr Ala Glu Lys Arg Gln Pro Val Ile Ser 915 920 925			2784
aaa aaa cgt gca aac ccg gaa gag gcc cct tca tca tcc aga aat aaa Lys Lys Arg Ala Asn Pro Glu Glu Ala Pro Ser Ser Ser Arg Asn Lys 930 935 940			2832
aaa ttg cat gta cat taa Lys Leu His Val His 945			2850

&lt;210&gt; 14

&lt;211&gt; 949

&lt;212&gt; PRT

&lt;213&gt; Photorhabdus luminescens

&lt;400&gt; 14

Met Lys Asn Ile Asp Pro Lys Leu Tyr Gln His Thr Pro Thr Val Asn 1 5 10 15
Val Tyr Asp Asn Arg Gly Leu Thr Ile Arg Asn Ile Asp Phe His Arg 20 25 30
Asp Val Ala Gly Gly Asp Thr Asp Thr Arg Ile Thr Arg His Gln Tyr 35 40 45

Asp Thr Arg Gly His Leu Ser Gln Ser Ile Asp Pro Arg Leu Tyr Asp  
 50 55 60  
 Ala Lys Gln Thr Asn Asn Ser Thr Asn Pro Asn Phe Leu Trp Gln Tyr  
 65 70 75 80  
 Asn Leu Thr Gly Asp Thr Leu Arg Thr Glu Ser Val Asp Ala Gly Arg  
 85 90 95  
 Thr Val Ala Leu Asn Asp Ile Glu Gly Arg Gln Val Leu Ile Val Thr  
 100 105 110  
 Ala Thr Gly Ala Ile Gln Thr Arg Gln Tyr Glu Ala Asn Thr Leu Pro  
 115 120 125  
 Gly Arg Leu Leu Ser Val Ser Glu Gln Ala Pro Gly Glu Gln Thr Pro  
 130 135 140  
 Arg Val Thr Glu His Phe Ile Trp Ala Gly Asn Thr Gln Ala Glu Lys  
 145 150 155 160  
 Asp His Asn Leu Ala Gly Gln Tyr Val Arg His Tyr Asp Thr Ala Gly  
 165 170 175  
 Val Thr Gln Leu Glu Ser Leu Ser Leu Thr Glu Asn Ile Leu Ser Gln  
 180 185 190  
 Ser Arg Gln Leu Leu Ala Asp Gly Gln Glu Ala Asp Trp Thr Gly Asn  
 195 200 205  
 Asp Glu Thr Leu Trp Gln Thr Lys Leu Asn Ser Glu Thr Tyr Thr Thr  
 210 215 220  
 Gln Ser Thr Phe Asp Ala Thr Gly Ala Leu Leu Thr Gln Thr Asp Ala  
 225 230 235 240  
 Lys Gly Asn Met Gln Arg Leu Ala Tyr Asn Val Ala Gly Gln Leu Gln  
 245 250 255  
 Gly Ser Trp Leu Thr Leu Lys Asn Gln Ser Glu Gln Val Ile Val Lys  
 260 265 270  
 Ser Leu Thr Tyr Ser Ala Ala Gly Gln Lys Leu Arg Glu Glu His Gly  
 275 280 285  
 Asn Gly Val Ile Thr Glu Tyr Ser Tyr Glu Pro Glu Thr Leu Arg Leu  
 290 295 300  
 Ile Gly Thr Thr Thr Arg Arg Gln Ser Asp Ser Lys Val Leu Gln Asp  
 305 310 315 320  
 Leu Arg Tyr Glu His Asp Pro Val Gly Asn Ile Ile Ser Val Arg Asn  
 325 330 335  
 Asp Ala Glu Ala Thr Arg Phe Trp Arg Asn Gln Lys Ile Val Pro Glu  
 340 345 350  
 Asn Thr Tyr Thr Tyr Asp Ser Leu Tyr Gln Leu Ile Ser Ala Thr Gly  
 355 360 365  
 Arg Glu Met Ala Asn Ile Gly Gln Gln Ser Asn Gln Leu Pro Ser Pro  
 370 375 380

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Ile Ile Pro Leu Pro Thr Asp Glu Asn Ser Tyr Thr Asn Tyr Thr Arg
385                               390                               395                               400

Ser Tyr Asn Tyr Asp Arg Gly Gly Asn Leu Val Gln Ile Arg His Ser
                               405                               410                               415

Ser Pro Ala Ala Gln Asn Asn Tyr Thr Thr Asp Ile Thr Val Ser Asn
                               420                               425                               430

Arg Ser Asn Arg Ala Val Leu Ser Ser Leu Thr Ser Asp Pro Thr Gln
                               435                               440                               445

Val Glu Ala Leu Phe Asp Ala Gly Gly His Gln Thr Lys Leu Leu Pro
450                               455                               460

Gly Gln Glu Leu Ser Trp Asn Thr Arg Gly Glu Leu Lys Gln Val Thr
465                               470                               475                               480

Pro Val Ser Arg Glu Ser Ala Ser Asp Arg Glu Trp Tyr Arg Tyr Gly
                               485                               490                               495

Asn Asp Gly Met Arg Arg Leu Lys Val Ser Glu Gln Gln Thr Gly Asn
                               500                               505                               510

Ser Thr Gln Gln Gln Arg Val Thr Tyr Leu Pro Asp Leu Glu Leu Arg
                               515                               520                               525

Thr Thr Gln Asn Gly Thr Thr Thr Ser Glu Asp Leu His Ala Ile Thr
530                               535                               540

Val Gly Ala Ala Gly His Ala Gln Val Arg Val Leu His Trp Glu Thr
545                               550                               555                               560

Thr Pro Pro Ala Gly Ile Asn Asn Asn Gln Leu Arg Tyr Ser Tyr Asp
                               565                               570                               575

Asn Leu Ile Gly Ser Ser Gln Leu Glu Leu Asp Asn Ala Gly Gln Ile
580                               585                               590

Ile Ser Gln Glu Glu Tyr Tyr Pro Phe Gly Gly Thr Ala Leu Trp Ala
595                               600                               605

Ala Arg Asn Gln Ile Glu Ala Ser Tyr Lys Ile Leu Arg Tyr Ser Gly
610                               615                               620

Lys Glu Arg Asp Ala Thr Gly Leu Tyr Tyr Tyr Gly Tyr Arg Tyr Tyr
625                               630                               635                               640

Gln Pro Trp Val Gly Arg Trp Leu Ser Ala Asp Pro Ala Gly Thr Ile
645                               650                               655

Asp Gly Leu Asn Leu Tyr Arg Met Val Arg Asn Asn Pro Ser Thr Leu
660                               665                               670

Val Asp Ile Ser Gly Leu Ala Pro Thr Lys Tyr Asn Ile Pro Gly Phe
675                               680                               685

Asp Phe Asp Val Glu Ile Asp Glu Gln Lys Arg Ser Lys Leu Lys Pro
690                               695                               700

Thr Leu Ile Arg Ile Lys Asp Glu Phe Leu His Tyr Gly Pro Val Asp
705                               710                               715                               720

Lys Leu Leu Glu Glu Lys Lys Pro Gly Leu Asn Val Pro Glu Glu Leu

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725										730					735				
Phe	Asp	Arg	Gly	Pro	Ser	Glu	Asn	Gly	Val	Ser	Thr	Leu	Thr	Phe	Lys				
			740					745					750						
Lys	Asp	Leu	Pro	Ile	Ser	Cys	Ile	Ser	Asn	Thr	Glu	Tyr	Thr	Leu	Asp				
		755					760					765							
Ile	Leu	Tyr	Asn	Lys	His	Glu	Thr	Lys	Pro	Phe	Pro	Tyr	Glu	Asn	Glu				
	770					775					780								
Ala	Thr	Val	Gly	Ala	Asp	Leu	Gly	Val	Ile	Met	Ser	Val	Glu	Phe	Gly				
785					790					795					800				
Asn	Lys	Ser	Ile	Gly	Asn	Ala	Ser	Asp	Glu	Asp	Leu	Lys	Glu	Glu	His				
				805					810					815					
Leu	Pro	Leu	Gly	Lys	Ser	Thr	Met	Asp	Lys	Thr	Asp	Leu	Pro	Asp	Leu				
			820					825					830						
Lys	Gln	Gly	Leu	Met	Ile	Ala	Glu	Lys	Ile	Lys	Ser	Gly	Lys	Gly	Ala				
		835					840					845							
Tyr	Pro	Phe	His	Phe	Gly	Ala	Ala	Ile	Ala	Val	Val	Tyr	Gly	Glu	Asp				
	850					855					860								
Lys	Lys	Val	Ala	Ala	Ser	Ile	Leu	Thr	Asp	Leu	Ser	Glu	Pro	Lys	Arg				
865					870					875					880				
Asp	Glu	Gly	Glu	Tyr	Leu	Gln	Ser	Thr	Arg	Lys	Val	Ser	Ala	Met	Phe				
				885					890					895					
Ile	Thr	Asn	Val	Asn	Glu	Phe	Arg	Gly	His	Asp	Tyr	Pro	Lys	Ser	Lys				
			900					905					910						
Tyr	Ser	Ile	Gly	Leu	Val	Thr	Ala	Glu	Lys	Arg	Gln	Pro	Val	Ile	Ser				
		915					920					925							
Lys	Lys	Arg	Ala	Asn	Pro	Glu	Glu	Ala	Pro	Ser	Ser	Ser	Arg	Asn	Lys				
	930					935					940								
Lys	Leu	His	Val	His															
945																			

&lt;210&gt; 15

&lt;211&gt; 2817

&lt;212&gt; DNA

&lt;213&gt; Photorhabdus luminescens

&lt;220&gt;

&lt;221&gt; CDS

&lt;222&gt; (1)..(2814)

&lt;400&gt; 15

atg	gaa	aac	att	gac	cca	aaa	ctt	tat	cac	cat	acg	cct	acc	gtc	agt	
Met	Glu	Asn	Ile	Asp	Pro	Lys	Leu	Tyr	His	His	Thr	Pro	Thr	Val	Ser	
1				5					10					15		

48

gtt	cac	gat	aac	cgt	gga	cta	gct	atc	cgt	aat	att	agt	ttt	cac	cgc	
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	--

96

Val	His	Asp	Asn	Arg	Gly	Leu	Ala	Ile	Arg	Asn	Ile	Ser	Phe	His	Arg		
			20					25					30				
act	acc	gca	gaa	gca	aat	acc	gat	acc	cgt	att	acc	cgc	cat	caa	tat		144
Thr	Thr	Ala	Glu	Ala	Asn	Thr	Asp	Thr	Arg	Ile	Thr	Arg	His	Gln	Tyr		
		35					40					45					
aat	gcc	ggc	gga	tat	ttg	aac	caa	agc	att	gat	cct	cgc	ctg	tat	gac		192
Asn	Ala	Gly	Gly	Tyr	Leu	Asn	Gln	Ser	Ile	Asp	Pro	Arg	Leu	Tyr	Asp		
	50					55					60						
gcc	aaa	cag	act	aac	aac	gct	gta	caa	ccg	aat	ttt	atc	tgg	cga	cat		240
Ala	Lys	Gln	Thr	Asn	Asn	Ala	Val	Gln	Pro	Asn	Phe	Ile	Trp	Arg	His		
65					70					75					80		
aat	ttg	acc	ggc	aat	atc	ctg	cga	aca	gag	agc	gtc	gat	gcc	ggg	cgg		288
Asn	Leu	Thr	Gly	Asn	Ile	Leu	Arg	Thr	Glu	Ser	Val	Asp	Ala	Gly	Arg		
				85					90					95			
acg	att	acc	ctc	aac	gat	att	gaa	ggc	cgc	ccg	gtg	ttg	acc	atc	aat		336
Thr	Ile	Thr	Leu	Asn	Asp	Ile	Glu	Gly	Arg	Pro	Val	Leu	Thr	Ile	Asn		
			100					105					110				
gca	gcc	ggg	gtc	cgg	caa	aac	cat	cgc	tac	gaa	gat	aac	acc	ctg	ccc		384
Ala	Ala	Gly	Val	Arg	Gln	Asn	His	Arg	Tyr	Glu	Asp	Asn	Thr	Leu	Pro		
		115					120					125					
ggg	cgc	ctg	ctc	gct	atc	agc	gaa	caa	gga	cag	gca	gaa	gag	aaa	acg		432
Gly	Arg	Leu	Leu	Ala	Ile	Ser	Glu	Gln	Gly	Gln	Ala	Glu	Glu	Lys	Thr		
	130					135					140						
acc	gag	cgc	ctt	atc	tgg	gcc	ggc	aat	acg	ccg	caa	gaa	aaa	gac	cac		480
Thr	Glu	Arg	Leu	Ile	Trp	Ala	Gly	Asn	Thr	Pro	Gln	Glu	Lys	Asp	His		
	145				150					155					160		
aac	ctt	gcc	ggg	cag	tgc	gtc	cgc	cat	tac	gat	acc	gca	gga	ctc	act		528
Asn	Leu	Ala	Gly	Gln	Cys	Val	Arg	His	Tyr	Asp	Thr	Ala	Gly	Leu	Thr		
				165					170					175			
caa	ctc	aac	agc	ctt	gcc	ctg	acc	ggc	gcc	gtt	cta	tca	caa	tct	caa		576
Gln	Leu	Asn	Ser	Leu	Ala	Leu	Thr	Gly	Ala	Val	Leu	Ser	Gln	Ser	Gln		
			180					185					190				
caa	ctg	ctt	acc	gat	aac	cag	gat	gcc	gac	tgg	aca	ggg	gaa	gac	cag		624
Gln	Leu	Leu	Thr	Asp	Asn	Gln	Asp	Ala	Asp	Trp	Thr	Gly	Glu	Asp	Gln		
		195					200					205					
agc	ctc	tgg	caa	caa	aaa	ctg	agt	agt	gat	gtc	tat	atc	acc	caa	agt		672
Ser	Leu	Trp	Gln	Gln	Lys	Leu	Ser	Ser	Asp	Val	Tyr	Ile	Thr	Gln	Ser		
	210					215					220						
aac	act	gat	gcc	acc	ggg	gct	tta	ctg	acc	cag	acc	gat	gcc	aaa	ggc		720
Asn	Thr	Asp	Ala	Thr	Gly	Ala	Leu	Leu	Thr	Gln	Thr	Asp	Ala	Lys	Gly		
	225				230					235				240			
aac	att	cag	cgg	ctg	gcc	tat	gat	gtg	gcc	ggg	cag	cta	aaa	ggg	agt		768
Asn	Ile	Gln	Arg	Leu	Ala	Tyr	Asp	Val	Ala	Gly	Gln	Leu	Lys	Gly	Ser		
				245				250						255			
tgg	tta	aca	ctc	aaa	ggg	cag	gcg	gaa	cag	gtg	att	atc	aaa	tcg	cta		816
Trp	Leu	Thr	Leu	Lys	Gly	Gln	Ala	Glu	Gln	Val	Ile	Ile	Lys	Ser	Leu		
			260					265					270				
acc	tac	tcc	gcc	gcc	ggg	caa	aaa	tta	cgt	gaa	gag	cac	ggg	aac	ggg		864



Thr	Tyr	Ser	Ala	Ala	Gly	Gln	Lys	Leu	Arg	Glu	Glu	His	Gly	Asn	Gly	
		275					280					285				
att	gtc	act	gaa	tac	agc	tac	gaa	ccg	gaa	acc	caa	cgg	ctt	atc	ggc	912
Ile	Val	Thr	Glu	Tyr	Ser	Tyr	Glu	Pro	Glu	Thr	Gln	Arg	Leu	Ile	Gly	
	290					295					300					
att	acc	act	cgc	cgt	cca	tca	gac	gcc	aag	gtg	ttg	caa	gac	cta	cgc	960
Ile	Thr	Thr	Arg	Arg	Pro	Ser	Asp	Ala	Lys	Val	Leu	Gln	Asp	Leu	Arg	
305					310					315					320	
tat	caa	tat	gac	cca	gta	ggc	aat	gtc	att	agt	atc	cgt	aat	gat	gcg	1008
Tyr	Gln	Tyr	Asp	Pro	Val	Gly	Asn	Val	Ile	Ser	Ile	Arg	Asn	Asp	Ala	
				325					330					335		
gaa	gcc	act	cgc	ttt	tgg	cgc	aat	cag	aaa	gta	gcc	ccg	gag	aat	agc	1056
Glu	Ala	Thr	Arg	Phe	Trp	Arg	Asn	Gln	Lys	Val	Ala	Pro	Glu	Asn	Ser	
			340					345					350			
tat	acc	tac	gat	tcc	ctg	tat	cag	ctt	atc	agc	gcc	acc	ggg	cgc	gag	1104
Tyr	Thr	Tyr	Asp	Ser	Leu	Tyr	Gln	Leu	Ile	Ser	Ala	Thr	Gly	Arg	Glu	
		355					360					365				
atg	gcc	aat	atc	ggt	cag	caa	agc	aac	caa	ctt	ccc	tct	ccg	gcg	cta	1152
Met	Ala	Asn	Ile	Gly	Gln	Gln	Ser	Asn	Gln	Leu	Pro	Ser	Pro	Ala	Leu	
	370				375						380					
cct	tct	gat	aac	aat	acc	tac	acc	aac	tat	act	cgc	act	tat	act	tat	1200
Pro	Ser	Asp	Asn	Asn	Thr	Tyr	Thr	Asn	Tyr	Thr	Arg	Thr	Tyr	Thr	Tyr	
385					390					395					400	
gac	cgt	ggc	ggc	aat	ttg	acg	aaa	att	cag	cat	agt	tca	cca	gcc	gcg	1248
Asp	Arg	Gly	Gly	Asn	Leu	Thr	Lys	Ile	Gln	His	Ser	Ser	Pro	Ala	Ala	
				405					410					415		
caa	aat	aac	tac	acg	acg	gat	ata	acg	gtt	tca	aat	cgc	agc	aac	cgc	1296
Gln	Asn	Asn	Tyr	Thr	Thr	Asp	Ile	Thr	Val	Ser	Asn	Arg	Ser	Asn	Arg	
			420				425					430				
gcg	gta	ctc	agc	aca	ttg	acc	gca	gat	cca	act	caa	gtc	gat	gcc	tta	1344
Ala	Val	Leu	Ser	Thr	Leu	Thr	Ala	Asp	Pro	Thr	Gln	Val	Asp	Ala	Leu	
		435					440					445				
ttt	gat	gcg	gga	ggc	cat	caa	acc	agc	ttg	tta	tcc	ggc	caa	gtt	cta	1392
Phe	Asp	Ala	Gly	Gly	His	Gln	Thr	Ser	Leu	Leu	Ser	Gly	Gln	Val	Leu	
	450				455						460					
act	ttg	aca	ccg	cga	ggc	gaa	ttg	aaa	caa	gcc	aac	aat	agc	gca	gga	1440
Thr	Trp	Thr	Pro	Arg	Gly	Glu	Leu	Lys	Gln	Ala	Asn	Asn	Ser	Ala	Gly	
465					470					475					480	
aat	gag	ttg	tat	cgc	tac	gat	agc	aac	ggc	ata	cgc	cag	cta	aaa	gtg	1488
Asn	Glu	Trp	Tyr	Arg	Tyr	Asp	Ser	Asn	Gly	Ile	Arg	Gln	Leu	Lys	Val	
				485					490					495		
aat	gaa	caa	caa	act	cag	aat	atc	ccg	caa	caa	caa	agg	gta	act	tat	1536
Asn	Glu	Gln	Gln	Thr	Gln	Asn	Ile	Pro	Gln	Gln	Gln	Arg	Val	Thr	Tyr	
			500					505					510			
cta	ccg	ggg	ctg	gaa	ata	cgt	aca	acc	cag	aac	aac	gcc	aca	aca	aca	1584
Leu	Pro	Gly	Leu	Glu	Ile	Arg	Thr	Thr	Gln	Asn	Asn	Ala	Thr	Thr	Thr	
		515					520					525				
gaa	gag	tta	cac	gtt	atc	aca	ctc	ggt	aaa	gcc	ggc	cgc	gcg	caa	gtc	1632

Glu 530	Glu	Leu	His	Val	Ile	Thr 535	Leu	Gly	Lys	Ala	Gly 540	Arg	Ala	Gln	Val		
cga 545	gta	ttg	cat	tgg	gag	agc	ggt	aaa	cca	gaa	gat	att	aat	aac	aat	1680	
Arg	Val	Leu	His	Trp	Glu 550	Ser	Gly	Lys	Pro	Glu 555	Asp	Ile	Asn	Asn	Asn 560		
cag 565	ctt	cgt	tac	agc	tac	gat	aat	ctt	att	ggc	tcc	agc	caa	ctt	caa	1728	
Gln	Leu	Arg	Tyr	Ser 565	Tyr	Asp	Asn	Leu	Ile 570	Gly	Ser	Ser	Gln	Leu 575	Gln		
tta 580	gat	agc	gac	gga	caa	att	atc	agt	gaa	gaa	gaa	tat	tat	cca	ttt	1776	
Leu	Asp	Ser	Asp	Gly	Gln	Ile	Ile	Ser 585	Glu	Glu	Glu	Tyr	Tyr 590	Pro	Phe		
ggt 595	ggt	aca	gcg	ctg	tgg	gcg	gca	agg	aat	caa	acc	gaa	gcc	agc	tat	1824	
Gly	Gly	Thr	Ala	Leu	Trp	Ala 600	Arg	Asn	Gln	Thr 605							
aaa 610	acc	att	cgt	tat	tct	ggt	aaa	gag	cgg	gat	gtt	acc	ggg	ctg	tat	1872	
Lys	Thr	Ile	Arg	Tyr	Ser 615	Gly	Lys	Glu	Arg	Asp 620	Val	Thr	Gly	Leu	Tyr		
tat 625	tat	ggc	tac	cgt	tat	tac	caa	ccg	tgg	gcg	ggc	aga	tgg	tta	ggt	1920	
Tyr	Tyr	Gly	Tyr	Arg	Tyr 630	Tyr	Gln	Pro	Trp	Ala 635	Gly	Arg	Trp	Leu	Gly 640		
gca 645	gac	ccg	gca	gga	acc	att	gat	gga	ctg	aat	tta	tat	cgc	atg	gtg	1968	
Ala	Asp	Pro	Ala	Gly 645	Thr	Ile	Asp	Gly	Leu 650	Asn	Leu	Tyr	Arg	Met 655	Val		
aga 660	aat	aac	ccg	gtg	acg	caa	ttt	gat	gtt	cag	gga	tta	tca	ccg	gcc	2016	
Arg	Asn	Asn	Pro	Val	Thr	Gln	Phe 665	Asp	Val	Gln	Gly	Leu	Ser 670	Pro	Ala		
aac 675	aga	aca	gaa	gaa	gcg	ata	ata	aaa	cag	ggt	tcc	ttt	acg	gga	atg	2064	
Asn	Arg	Thr	Glu	Glu	Ala	Ile 680	Ile	Lys	Gln	Gly	Ser	Phe 685	Thr	Gly	Met		
gaa 690	gaa	gct	gtt	tat	aaa	aaa	atg	gct	aaa	cct	caa	act	ttc	aaa	cgc	2112	
Glu	Glu	Ala	Val	Tyr	Lys 695	Lys	Met	Ala	Lys	Pro 700	Gln	Thr	Phe	Lys	Arg		
caa 705	aga	gct	atc	gct	gcc	caa	aca	gag	caa	gaa	gcc	cat	gaa	tca	ttg	2160	
Gln	Arg	Ala	Ile	Ala 710	Ala	Gln	Thr	Glu	Gln 715	Glu	Ala	His	Glu	Ser	Leu 720		
acc 725	aac	aac	cct	agt	gta	gat	att	agc	cca	att	aaa	aac	tac	acc	aca	2208	
Thr	Asn	Asn	Pro	Ser 725	Val	Asp	Ile	Ser	Pro 730	Ile	Lys	Asn	Tyr 735	Thr	Thr		
gat 740	agc	tca	caa	att	aat	gcc	gcg	ata	agg	gaa	aat	cgt	att	acg	cca	2256	
Asp	Ser	Ser	Gln	Ile	Asn	Ala	Ala 745	Ile	Arg	Glu	Asn	Arg 750	Ile	Thr	Pro		
gca 755	gtg	gaa	agt	tta	gac	gcc	aca	tta	tct	tcc	cta	caa	gat	aga	caa	2304	
Ala	Val	Glu	Ser	Leu	Asp	Ala 760	Thr	Leu	Ser	Ser	Leu	Gln 765	Asp	Arg	Gln		
atg 770	agg	gta	act	tat	cgg	gtg	atg	acc	tat	gta	gat	aat	tcc	acg	cca	2352	
Met	Arg	Val	Thr	Tyr	Arg 775	Val	Met	Thr	Tyr	Val 780	Asp	Asn	Ser	Thr	Pro		
tcg	cct	tgg	cac	tcg	cca	cag	gaa	gga	aat	agt	att	aat	gtt	ggt	gat	2400	

Ser Pro Trp His Ser Pro Gln Glu Gly Asn Ser Ile Asn Val Gly Asp  
 785 790 795 800  
 atc gtt tcg gat aac gct tat tta tca aca tcg gcc cat cgt ggt ttt 2448  
 Ile Val Ser Asp Asn Ala Tyr Leu Ser Thr Ser Ala His Arg Gly Phe  
 805 810 815  
 ctg aat ttt gtt cac aaa aaa gaa acc agt gaa act cga tac gtc aag 2496  
 Leu Asn Phe Val His Lys Lys Glu Thr Ser Glu Thr Arg Tyr Val Lys  
 820 825 830  
 atg gca ttt tta acg aat gcg ggt gtc aat gtc cca gca gca tct atg 2544  
 Met Ala Phe Leu Thr Asn Ala Gly Val Asn Val Pro Ala Ala Ser Met  
 835 840 845  
 tat aat aat gct ggc gag gag caa gta ttt aaa atg gat tta aac gat 2592  
 Tyr Asn Asn Ala Gly Glu Glu Val Phe Lys Met Asp Leu Asn Asp  
 850 855 860  
 tca aga aaa agc ctt gct gaa aaa tta aaa cta aga gtc agt gga cca 2640  
 Ser Arg Lys Ser Leu Ala Glu Lys Leu Lys Leu Arg Val Ser Gly Pro  
 865 870 875 880  
 caa tcg gga caa gcg gaa ata tta cta cct agg gaa aca cag ttc gaa 2688  
 Gln Ser Gly Gln Ala Glu Ile Leu Leu Pro Arg Glu Thr Gln Phe Glu  
 885 890 895  
 gtt gtt tca atg aaa cat caa ggc aga gat acc tat gta tta ttg caa 2736  
 Val Val Ser Met Lys His Gln Gly Arg Asp Thr Tyr Val Leu Leu Gln  
 900 905 910  
 gat att aac caa tcc gca gcc act cat aga aat gta cgt aac act tac 2784  
 Asp Ile Asn Gln Ser Ala Ala Thr His Arg Asn Val Arg Asn Thr Tyr  
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 Thr Gly Asn Phe Lys Ser Ser Ser Ala Asn  
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<210> 16

<211> 938

<212> PRT

<213> Photorhabdus luminescens

<400> 16

Met Glu Asn Ile Asp Pro Lys Leu Tyr His His Thr Pro Thr Val Ser  
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 Val His Asp Asn Arg Gly Leu Ala Ile Arg Asn Ile Ser Phe His Arg  
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 Thr Thr Ala Glu Ala Asn Thr Asp Thr Arg Ile Thr Arg His Gln Tyr  
 35 40 45  
 Asn Ala Gly Gly Tyr Leu Asn Gln Ser Ile Asp Pro Arg Leu Tyr Asp  
 50 55 60  
 Ala Lys Gln Thr Asn Asn Ala Val Gln Pro Asn Phe Ile Trp Arg His  
 65 70 75 80

Asn	Leu	Thr	Gly	Asn 85	Ile	Leu	Arg	Thr	Glu 90	Ser	Val	Asp	Ala	Gly 95	Arg
Thr	Ile	Thr	Leu 100	Asn	Asp	Ile	Glu	Gly 105	Arg	Pro	Val	Leu	Thr 110	Ile	Asn
Ala	Ala	Gly 115	Val	Arg	Gln	Asn	His 120	Arg	Tyr	Glu	Asp	Asn 125	Thr	Leu	Pro
Gly	Arg 130	Leu	Leu	Ala	Ile	Ser 135	Glu	Gln	Gly	Gln	Ala 140	Glu	Glu	Lys	Thr
Thr 145	Glu	Arg	Leu	Ile	Trp 150	Ala	Gly	Asn	Thr	Pro 155	Gln	Glu	Lys	Asp	His 160
Asn	Leu	Ala	Gly	Gln 165	Cys	Val	Arg	His	Tyr 170	Asp	Thr	Ala	Gly	Leu 175	Thr
Gln	Leu	Asn	Ser 180	Leu	Ala	Leu	Thr	Gly 185	Ala	Val	Leu	Ser	Gln 190	Ser	Gln
Gln	Leu	Leu 195	Thr	Asp	Asn	Gln	Asp 200	Ala	Asp	Trp	Thr	Gly 205	Glu	Asp	Gln
Ser	Leu 210	Trp	Gln	Gln	Lys	Leu 215	Ser	Ser	Asp	Val	Tyr 220	Ile	Thr	Gln	Ser
Asn 225	Thr	Asp	Ala	Thr	Gly 230	Ala	Leu	Leu	Thr	Gln 235	Thr	Asp	Ala	Lys	Gly 240
Asn	Ile	Gln	Arg	Leu 245	Ala	Tyr	Asp	Val	Ala 250	Gly	Gln	Leu	Lys	Gly 255	Ser
Trp	Leu	Thr	Leu 260	Lys	Gly	Gln	Ala	Glu 265	Gln	Val	Ile	Ile	Lys 270	Ser	Leu
Thr	Tyr	Ser 275	Ala	Ala	Gly	Gln	Lys 280	Leu	Arg	Glu	Glu	His 285	Gly	Asn	Gly
Ile	Val 290	Thr	Glu	Tyr	Ser	Tyr 295	Glu	Pro	Glu	Thr	Gln 300	Arg	Leu	Ile	Gly
Ile 305	Thr	Thr	Arg	Arg	Pro 310	Ser	Asp	Ala	Lys	Val 315	Leu	Gln	Asp	Leu	Arg 320
Tyr	Gln	Tyr	Asp	Pro 325	Val	Gly	Asn	Val	Ile 330	Ser	Ile	Arg	Asn	Asp 335	Ala
Glu	Ala	Thr	Arg 340	Phe	Trp	Arg	Asn	Gln 345	Lys	Val	Ala	Pro	Glu 350	Asn	Ser
Tyr	Thr	Tyr 355	Asp	Ser	Leu	Tyr	Gln 360	Leu	Ile	Ser	Ala	Thr 365	Gly	Arg	Glu
Met	Ala 370	Asn	Ile	Gly	Gln	Gln 375	Ser	Asn	Gln	Leu	Pro 380	Ser	Pro	Ala	Leu
Pro 385	Ser	Asp	Asn	Asn	Thr 390	Tyr	Thr	Asn	Tyr	Thr 395	Arg	Thr	Tyr	Thr	Tyr 400
Asp	Arg	Gly	Gly	Asn 405	Leu	Thr	Lys	Ile	Gln 410	His	Ser	Ser	Pro	Ala 415	Ala
Gln	Asn	Asn	Tyr	Thr	Thr	Asp	Ile	Thr	Val	Ser	Asn	Arg	Ser	Asn	Arg

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Ala	Val	Leu	Ser	Thr	Leu	Thr	Ala	Asp	Pro	Thr	Gln	Val	Asp	Ala	Leu
		435					440					445			
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	450					455					460				
Thr	Trp	Thr	Pro	Arg	Gly	Glu	Leu	Lys	Gln	Ala	Asn	Asn	Ser	Ala	Gly
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Asn	Glu	Trp	Tyr	Arg	Tyr	Asp	Ser	Asn	Gly	Ile	Arg	Gln	Leu	Lys	Val
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Asn	Glu	Gln	Gln	Thr	Gln	Asn	Ile	Pro	Gln	Gln	Gln	Arg	Val	Thr	Tyr
			500					505					510		
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		515					520					525			
Glu	Glu	Leu	His	Val	Ile	Thr	Leu	Gly	Lys	Ala	Gly	Arg	Ala	Gln	Val
	530					535					540				
Arg	Val	Leu	His	Trp	Glu	Ser	Gly	Lys	Pro	Glu	Asp	Ile	Asn	Asn	Asn
545					550					555					560
Gln	Leu	Arg	Tyr	Ser	Tyr	Asp	Asn	Leu	Ile	Gly	Ser	Ser	Gln	Leu	Gln
				565					570					575	
Leu	Asp	Ser	Asp	Gly	Gln	Ile	Ile	Ser	Glu	Glu	Glu	Tyr	Tyr	Pro	Phe
			580					585					590		
Gly	Gly	Thr	Ala	Leu	Trp	Ala	Ala	Arg	Asn	Gln	Thr	Glu	Ala	Ser	Tyr
		595				600						605			
Lys	Thr	Ile	Arg	Tyr	Ser	Gly	Lys	Glu	Arg	Asp	Val	Thr	Gly	Leu	Tyr
	610					615					620				
Tyr	Tyr	Gly	Tyr	Arg	Tyr	Tyr	Gln	Pro	Trp	Ala	Gly	Arg	Trp	Leu	Gly
625					630					635					640
Ala	Asp	Pro	Ala	Gly	Thr	Ile	Asp	Gly	Leu	Asn	Leu	Tyr	Arg	Met	Val
				645					650					655	
Arg	Asn	Asn	Pro	Val	Thr	Gln	Phe	Asp	Val	Gln	Gly	Leu	Ser	Pro	Ala
			660					665					670		
Asn	Arg	Thr	Glu	Glu	Ala	Ile	Ile	Lys	Gln	Gly	Ser	Phe	Thr	Gly	Met
		675					680					685			
Glu	Glu	Ala	Val	Tyr	Lys	Lys	Met	Ala	Lys	Pro	Gln	Thr	Phe	Lys	Arg
	690					695					700				
Gln	Arg	Ala	Ile	Ala	Ala	Gln	Thr	Glu	Gln	Glu	Ala	His	Glu	Ser	Leu
705					710					715					720
Thr	Asn	Asn	Pro	Ser	Val	Asp	Ile	Ser	Pro	Ile	Lys	Asn	Tyr	Thr	Thr
			725						730					735	
Asp	Ser	Ser	Gln	Ile	Asn	Ala	Ala	Ile	Arg	Glu	Asn	Arg	Ile	Thr	Pro
			740					745					750		
Ala	Val	Glu	Ser	Leu	Asp	Ala	Thr	Leu	Ser	Ser	Leu	Gln	Asp	Arg	Gln
		755					760					765			

Met	Arg	Val	Thr	Tyr	Arg	Val	Met	Thr	Tyr	Val	Asp	Asn	Ser	Thr	Pro
770						775					780				
Ser	Pro	Trp	His	Ser	Pro	Gln	Glu	Gly	Asn	Ser	Ile	Asn	Val	Gly	Asp
785					790					795					800
Ile	Val	Ser	Asp	Asn	Ala	Tyr	Leu	Ser	Thr	Ser	Ala	His	Arg	Gly	Phe
				805					810					815	
Leu	Asn	Phe	Val	His	Lys	Lys	Glu	Thr	Ser	Glu	Thr	Arg	Tyr	Val	Lys
			820					825					830		
Met	Ala	Phe	Leu	Thr	Asn	Ala	Gly	Val	Asn	Val	Pro	Ala	Ala	Ser	Met
		835					840					845			
Tyr	Asn	Asn	Ala	Gly	Glu	Glu	Gln	Val	Phe	Lys	Met	Asp	Leu	Asn	Asp
	850					855					860				
Ser	Arg	Lys	Ser	Leu	Ala	Glu	Lys	Leu	Lys	Leu	Arg	Val	Ser	Gly	Pro
865					870					875					880
Gln	Ser	Gly	Gln	Ala	Glu	Ile	Leu	Leu	Pro	Arg	Glu	Thr	Gln	Phe	Glu
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Val	Val	Ser	Met	Lys	His	Gln	Gly	Arg	Asp	Thr	Tyr	Val	Leu	Leu	Gln
			900					905					910		
Asp	Ile	Asn	Gln	Ser	Ala	Ala	Thr	His	Arg	Asn	Val	Arg	Asn	Thr	Tyr
		915					920					925			
Thr	Gly	Asn	Phe	Lys	Ser	Ser	Ser	Ala	Asn						
	930					935									